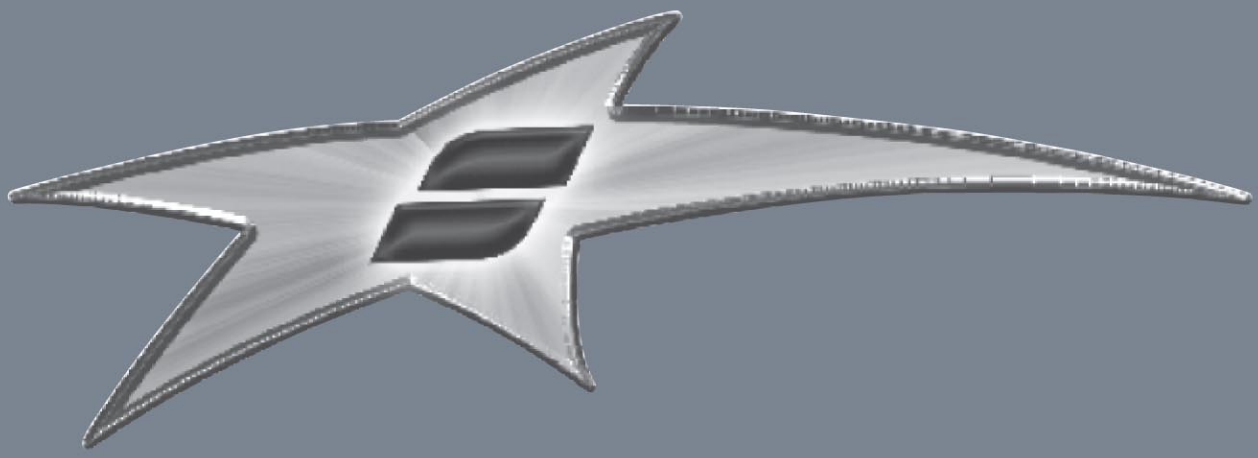
STARCRAFT®

OWNER'S MANUAL



Expandables

To our customers: *for your safety and that of others, it is necessary that you read and understand this entire manual prior to your first camping excursion.*

As the owner of this Starcraft RV, Inc. brand product
you are eligible for active membership in the
Starcraft RV, Inc. Camper Club
For details write:
Director, Starcraft RV, Inc. Camper Club • P O Box 176 • Osceola, IN 46561-0176

The Starcraft RV, Inc. Camper Club consists of the Starcraft RV, Inc. RV owners from coast to coast who enjoy organized recreational vehicle activity. As a member, you can attend several of the camping events organized each year by your state chapter and international office. Each July, you can spend a week at the Starcraft RV, Inc. International Camper Club Rally -- an event that attracts hundreds of Starcraft RV, Inc. families from all over North America. If that's not enough to convince you, here are more reasons why you should join:

- **Friendship Rallies**
- **Regional Rallies**
- **Yearly International Rally**
- **New Membership Kit & Membership Plaque**
- **Chatter Newspaper**
- **Discounts on Atlas, Campground Guides and Magazines**
- **Club Camping with other Starcraft RV, Inc. Members**

STARCRAFT®

Dear Starcraft Consumer:

Congratulations on your purchase of a Starcraft RV. On behalf of Starcraft RV, Inc., we, the Starcraft RV, Inc. employees, offer you our warmest welcome!

We greatly value the confidence you placed in Starcraft RV, Inc. by your recent purchasing decision. We are equally confident you will have many years of pleasant RV experiences in your new Starcraft RV, because of our continuing dedication of providing you with the most complete brand of consumer satisfaction in the RV Industry today: **Starcraft RV, Inc.**.

To help assure your continued satisfaction and enjoyment of your Starcraft RV we request you take the time right now to study and understand all of the information and pamphlets supplied with your Starcraft. The Owner's Manual is an invaluable resource containing important recommendations on proper usage, maintenance and servicing of your Starcraft RV. A few minutes spent learning the functions of the systems on your Starcraft plus the installation and operation of any appliances supplied with your Starcraft can reduce or eliminate future problems. Failure to properly maintain your RV will result in denial of warranty.

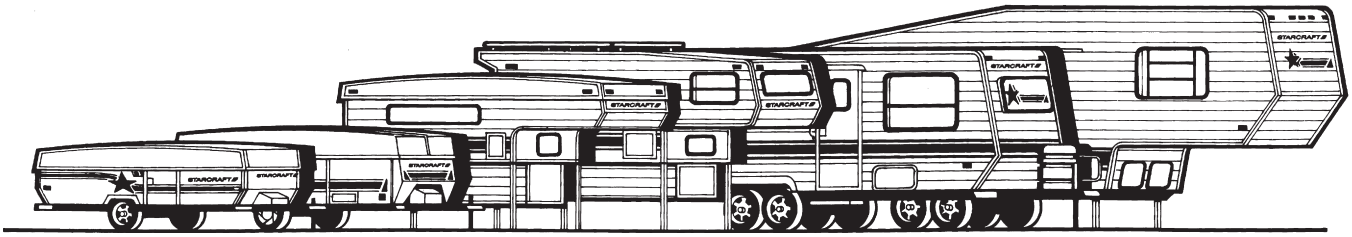
It is very important to validate all accompanying service warranties. Please take a minute now to complete the registration cards and mail the cards to the respective manufacturers, today.

If you should require service, an authorized Starcraft RV Dealer can properly service your Starcraft as well as answer other questions you may have.

Thank you for purchasing a Starcraft. We hope you are – and will continue to be – satisfied with your RV and will feel free to recommend a Starcraft to other members of your family, your friends and neighbors as well.

Most Cordially,

Starcraft RV, Inc. Family of Employees



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Starcraft RV, Inc. 1-Year Limited Warranty

WHAT AND WHO IS COVERED

The Starcraft RV, Inc. warranty covers the recreational vehicle ("RV"), when used only for its intended purpose of recreational travel and camping, for one (1) year. The warranty period begins on the date that the RV is delivered to the first retail purchaser by an independent, authorized dealer of Starcraft RV, Inc., or, if the dealer places the vehicle in service prior to retail sale, on the date the RV is first placed in such service. In the event that a substantial defect in material or workmanship, attributable to Starcraft RV, Inc., is found to exist during the warranty period, it will be repaired or replaced, at Starcraft RV, Inc.'s option, without charge to the RV owner, in accordance with the terms, conditions and limitations of this limited warranty.

This limited warranty applies to the first consumer purchaser, and the next subsequent owner, only. This limited warranty may be transferred once during the warranty period. However, the subsequent owner must submit a warranty transfer form to Starcraft RV, Inc. to make the warranty transfer effective. You may contact an independent, authorized dealer for details. All rights and limitations within this warranty are applicable to the original owner and the subsequent owner of the RV. The subsequent owner's warranty coverage period is the remaining balance of the warranty coverage period that the prior owner was entitled to under this limited warranty.

Starcraft RV, Inc.'s obligation to repair or replace defective materials or workmanship is the sole obligation of Starcraft RV, Inc. under this limited warranty. Starcraft RV, Inc. reserves the right to use new or remanufactured parts of similar quality to complete any work, and to make parts and design changes from time to time without notice to anyone. Starcraft RV, Inc. reserves the right to make changes in the design or material of its products without incurring any obligation to incorporate such changes in any product previously manufactured. Starcraft RV, Inc. makes no warranty as to the future performance of this RV, and this limited warranty is not intended to extend to the future performance of this RV, or any of its materials, components or parts. In addition, the RV owner's obligation to notify Starcraft RV, Inc., or one of its independent, authorized dealers, of a claimed defect does not modify any obligation placed on the RV owner to contact Starcraft RV, Inc. directly when attempting to pursue remedies under state or federal law.

LIMITATIONS, EXCLUSIONS AND DISCLAIMER OF IMPLIED WARRANTIES

ANY IMPLIED WARRANTY THAT IS FOUND TO ARISE BY WAY OF STATE OR FEDERAL LAW, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR ANY IMPLIED WARRANTY OF FITNESS, IS LIMITED IN DURATION TO THE DURATION SET FORTH IN THIS LIMITED WARRANTY AND IS LIMITED IN SCOPE OF COVERAGE TO THE SCOPE OF COVERAGE OF THIS LIMITED WARRANTY. Starcraft RV, Inc. makes no warranty of any nature beyond that contained in this limited warranty. Starcraft RV, Inc. does not authorize any person to create any other obligation or liability for it regarding this RV, and Starcraft RV, Inc. is not responsible for any representation, promise or warranty made by any dealer or other person beyond what is expressly stated in this limited warranty, and no one has the authority to enlarge, amend or modify this limited warranty. Any selling or servicing dealer is not Starcraft RV, Inc.'s agent, but an independent entity.

STARCRAFT RV, INC. SHALL NOT BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES THAT MAY RESULT FROM BREACH OF THIS LIMITED WARRANTY OR ANY IMPLIED WARRANTY. THIS EXCLUSION OF CONSEQUENTIAL AND INCIDENTAL DAMAGES SHALL BE INDEPENDENT OF ANY FAILURE OF THE ESSENTIAL PURPOSE OF ANY WARRANTY, AND THIS EXCLUSION SHALL SURVIVE ANY DETERMINATION THAT THIS LIMITED WARRANTY OR ANY IMPLIED WARRANTY HAS FAILED OF ITS ESSENTIAL PURPOSE.

Some states do not allow limitations on how long an implied warranty lasts, or the exclusion or limitation of incidental or consequential damages, so the above limitations or exclusions may not apply to you.

HOW TO GET SERVICE

To obtain warranty service the owner must do all of the following:

1. **Notify an independent, authorized dealer of Starcraft RV, Inc., or Starcraft RV, Inc., of the substantial defect in material or workmanship attributable to Starcraft RV, Inc., within the warranty coverage period designated above;**
2. **Provide the notification mentioned in (1), above, within ten (10) days of when the owner discovered, or should have discovered, the substantial defect in material or workmanship attributable to Starcraft RV, Inc.;**
3. **Promptly schedule an appointment with and take the RV to an independent, authorized dealer of Starcraft RV, Inc., or Starcraft RV, Inc., for repairs; and**
4. **Pays any freight or transportation costs, import duties, fees and all incidental expenses associated with obtaining warranty service.**

For warranty service, simply contact one of Starcraft RV, Inc.'s independent, authorized service centers for an appointment and then deliver your RV to the service center on the specified appointment date. If you need assistance you may contact Starcraft RV, Inc., at P.O. Box 458, Topeka, Indiana 46571, Attn: Warranty Department, (260) 593-2550, or http://www.starcraftrv.com.

NOTE: Starcraft RV, Inc. does not control the scheduling of service work at the independent, authorized dealerships. You may encounter some delay in scheduling or completion of work. Also, you must notify the selling dealer, or Starcraft RV, Inc., within three (3) days of delivery to have work performed on any defect or damage to appearance items that occurred at the factory during manufacturer, during delivery of the RV to the selling dealer or on the selling dealer's lot at no cost to you as provided by this limited warranty. (See below under WHAT IS NOT COVERED).

If two (2) or more service attempts have been made to correct any covered defect that you believe impairs the value, use or safety of the RV, or if it has taken longer than thirty (30) days for those types of repairs to be completed, you must, to the extent permitted by law, notify Starcraft RV, Inc. directly, in writing, at the above address, of the unsuccessful repair(s) of the alleged defect(s) so that Starcraft RV, Inc. can become directly involved in making sure that you are provided service pursuant to the terms of this limited warranty.

WHAT IS NOT COVERED

By way of example only, this Limited Warranty does not cover any of the following: defects in materials, components or parts of the RV not attributable to Starcraft RV, Inc., items that are added or changed after the RV leaves the possession of Starcraft RV, Inc.; additional equipment or accessories installed at any dealership, or other place of business, or by any other party, other than Starcraft RV, Inc.; any RV used for rental or other commercial purposes (Note: It shall be concluded that the RV has been used for commercial and/or business purposes if the RV owner or user files a tax form claiming any business or commercial tax benefit related to the RV, or if the RV is purchased in a business name); any RV not used solely for recreational travel and camping or any RV used as a permanent or semi-permanent residence (Note: It shall be concluded that the RV has been used as a residence if you use it as your primary residence or for full time travel); normal wear, tear or usage, such as tears, punctures, soiling, mildew, fading, or discoloration of exterior plastic or fiberglass, or soft goods., such as upholstery, drapes, carpet, vinyl, screens, cushions, mattresses and fabrics; the effect of condensation or moisture from condensation inside the RV; mold or any damage caused by mold to the inside or outside of the RV; imperfections that do not affect the suitability of the RV for its intended purpose of recreational use or items that are working as designed but that you are unhappy with; problems, including water leaks, related to misuse, mishandling, neglect or abuse, including failure to maintain the RV in accordance with the owner's manual, or other routine maintenance such as proper use, storage, inspections, lubricating, adjustments, tightening of screws, tightening of lug nuts, sealing, rotating tires; damage due to accident, whether or not foreseeable, including any acts of weather or damage or corrosion due to the environment, theft, vandalism, fire, or other intervening acts not attributable to Starcraft RV, Inc.; damage resulting from tire wear or tire failure; defacing, scratches, dents, chips on any surface or fabric of the RV; damage caused by off road use, overloading the RV or alteration of the RV, or any of its components or parts; wheel alignment or adjustments to axles when caused by improper maintenance, loading or damage from road hazards, including off road travel, wheel damage or balancing or damage from tire failures.

In addition, this limited warranty does not cover any material, component or part of the RV that is warranted by another entity, including, by way of example, handling, braking, wheel balance, muffler, tires, tubes, batteries, gauges, generator, jacks, inverter, microwave, television, DVD, VCR, CD player, tape player, radio, speakers, television, refrigerator, range, water heater, stove, carbon monoxide detector, smoke detector, furnace or any air conditioner. (Note: The written warranty provided by the manufacturer of the component part is the direct responsibility of that manufacturer).

Defects and/or damage to interior and exterior surfaces, trim, upholstery and other appearance items may occur at the factory, during delivery of the RV to the selling dealer or on the selling dealer's lot. These items are usually detected and corrected at the factory or by the selling dealer prior to delivery to the retail customer. You must inspect your RV for this type of damage when you take delivery. If you find any such defect or damage you must notify the selling dealer, or Starcraft RV, Inc., immediately to have these items covered by this limited warranty and to have work performed on the items at no cost to you as provided by this limited warranty. The owner is responsible to inspect the RV prior to signing the "Inspection and Acceptance Declaration" section of the "Owner Protection Warranty Registration."

EVENTS DISCHARGING STARCRAFT RV, INC. FROM OBLIGATION UNDER WARRANTY

Certain things completely discharge Starcraft RV, Inc. from any obligation under this warranty and void it. By way of example, the following shall discharge Starcraft RV, Inc. from any express or implied warranty obligation to repair or replace any defect that results from: any rental or other commercial use or purchase of the RV (as defined in this warranty), any defect in a separately manufactured component part, owner neglect or failure to provide routine maintenance (See Owner's Manual), unauthorized alteration, off road use, collision or accident, whether or not foreseeable, including any acts of weather or damage or corrosion due to the environment, theft, vandalism, fire, explosions, overloading in excess of weight ratings, and tampering with any portion of the RV.

LEGAL REMEDIES

Any action to enforce any portion of this limited warranty, or any implied warranty, shall be commenced within six (6) months after expiration of the warranty coverage period designated above. Any performance of repairs shall not suspend any limitation period from expiring. Any performance of repairs after the warranty coverage period has expired, or performance of repairs regarding any thing excluded from coverage under this limited warranty shall be considered "good will" repairs, and they will not alter the express terms of this limited warranty, or extend the warranty coverage period or this limitation period in this paragraph. In addition, this warranty is not intended to extend to future performance, and nothing in this warranty, or any action of Starcraft RV, Inc., or any agent of Starcraft RV, Inc., shall be interpreted as an extension of the warranty or this limitation period. Some states do not allow a reduction in the statue of limitations, so this reduction may not apply to you.

WARRANTY REGISTRATIONS

Your warranty registration records should be completed and delivered to the manufacturers of component parts. The selling dealership will assist you in completing and filling out the Starcraft RV, Inc. Owner Protection Warranty Registration form. That form must be returned to Starcraft RV, Inc. within the (10) days of your taking delivery of the RV. Your Starcraft RV, Inc. warranty will not be registered unless this warranty registration is completed and received by Starcraft RV, Inc.. Failure to file this warranty registration with Starcraft RV, Inc. will not affect your rights under this limited warranty as long as you can present proof of purchase, but it can cause delays in obtaining the benefits of this limited warranty, and it may inhibit any servicing facility's ability to provide proper repairs and/or part replacement. The selling dealer is also obligated to maintain the RV prior to retail sale, to perform a pre-delivery inspection with the customer, and to repair and replace any parts necessary and correct defects in materials or workmanship prior to delivery.

CARE AND MAINTENANCE

It is the Owner's responsibility to perform proper care and maintenance of the RV, and to assure correct load distribution. For details regarding this, please see your Starcraft RV, Inc. owner's manual and the owner's manuals of other component part manufacturers. These outline various care and maintenance that is required to maintain your RV. Please review all manuals supplied with your RV, and contact your selling dealership or supplier of the component part if you have questions. Note: Failure to maintain the RV as noted in those manuals voids this limited warranty, and any damage to the RV as a result of your failure to perform such care, is not covered by this limited warranty.

THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY ALSO HAVE OTHER RIGHTS THAT VARY FROM STATE TO STATE.

STARCRAFT RV, INC. P.O. Box 458, Topeka, Indiana 46571 Telephone: (260) 593-2550

Special Safety Procedures

In order to make your camping experience a safe one, it is important that EVERYONE who is going to use your camper be familiar with the operating instructions contained in this manual. The following are some safety points which are discussed more fully later in this manual, but we want to EMPHASIZE THAT YOU READ THEM HERE AS WELL:

1. Learn to drive with your unit. Driving with a trailer is not the same as driving your car. You must take time and get the instruction (if necessary) to learn the different driving characteristics and maneuvering procedures (see *Towing Equipment,* page 8 and *Driving Rules,* page 9 sections in this manual).

2. Know how to respond to a propane leak. A propane leak could cause an explosion.

⚠ DANGER

IF YOU SMELL Propane

1. Extinguish any open flames, pilot lights and all smoking materials.
2. Do not touch electrical switches.
3. Shut off the Propane supply at the container valve(s) or Propane supply connection.
4. Open doors and other ventilating openings.
5. Leave the area until odor clears.
6. Have the Propane system checked and leakage source corrected before using again.

FAILURE TO COMPLY COULD RESULT IN EXPLOSION RESULTING IN DEATH OR SERIOUS INJURY.

DD-90

3. DO NOT use Propane while traveling. The main Propane service valve must be shut off while traveling because of the danger of a fire or explosion if a Propane line under pressure were ruptured in an accident. In addition to being unsafe, it is **ILLEGAL** in some states to operate a Propane appliance while the vehicle is in motion.

4. Refilling the Propane bottle. Never smoke or light an open flame either inside your unit or near it while the Propane bottle is being refilled. Use an approved leak detector kit or soapy water solution when checking for leaks; never use an open flame. To avoid an explosion when you reinstall your bottle, make sure that all valves are off and pilot lights out **BEFORE YOU OPEN THE SERVICE VALVE ON THE REFILLED BOTTLE.**

5. Cooking. Great caution should be exercised when cooking inside your camper. Cooking devices emit exhaust fumes which contain deadly carbon monoxide. Combustion also consumes oxygen which is necessary for breathing to sustain life; therefore, steps must be taken to disburse carbon monoxide and supply combustion air in order to avoid asphyxiation. Open the roof vent and a window to provide adequate ventilation when cooking. Portable cooking devices, including grills and stoves, which burn wood or charcoal should never be used inside your camper, as they may cause fire or asphyxiation.

⚠ WARNING

IT IS NOT SAFE TO USE COOKING APPLIANCES FOR COMFORT HEATING.

Cooking appliances need fresh air for safe operation.

Before operation:

1. Open overhead vent or turn on exhaust fan.
2. Open window.

FAILURE TO COMPLY COULD RESULT IN DEATH OR SERIOUS INJURY. DD-26C

WARNING: Propane containers shall not be placed or stored inside the vehicle. Propane containers are equipped with safety devices that relieve excessive pressure by discharging Propane to the atmosphere.

WARNING: IT IS NOT SAFE TO USE COOKING APPLIANCES FOR COMFORT HEATING.

6. Water. When a disinfectant or antifreeze solution has been put into the unit's water system, do not use the system until it has been thoroughly flushed with water. Starcraft RV, Inc. recommends that you fill the water system with water 4 - 6 times to assure that it has been flushed thoroughly. Keep children away from the unit until the water is safe to drink. Use only the following types of antifreeze: (A) 60% glycerol, by weight in water, undiluted, or (B) 22% magnesium chloride by weight, in water, undiluted. Store bought potable, non toxic RV antifreeze may be used.

WARNING: Automotive, radiator or windshield washer antifreeze could be harmful or fatal if swallowed. Do not use them in the fresh water system or to protect drain traps from freezing.

7. Hookup to campground electrical system. The power cord provided with your unit is normally adequate, but if you need an extension, be sure to use a 3-wire extension cord rated for at least 30 amps. If you use a 2-wire extension cord or a cheater plug with the third pin removed, your unit would not be properly grounded and someone could receive a serious, even fatal, shock. Your system might burn out a power cord rated at less than 30 amps.

WARNING: If using 110 volt appliances outside the camper, use only the exterior receptacle which is protected by a GFI (ground fault interrupter) circuit breaker to protect against electrical shock.

8. Towing your vehicle. Towing your new trailer is a serious endeavor which, if not done properly, can have serious consequences. It is imperative, therefore, that you read and understand this complete owner's manual, but especially the sections entitled *Towing Equipment Selection and Preparation for Towing, Driving Rules for Trailer Towing, Weight Ratings and Weight Distribution* and *Traveling*. If you have any questions, or if there is something you don't understand, please contact your dealer, or call Starcraft RV, Inc. Factory Technical Service.

Introduction

Each Expandable has been thoroughly inspected before shipment. It is the responsibility of your dealer to inspect the trailer and to make sure that everything is in good working order before you accept delivery. Your dealer is prepared to instruct you in its basic use, but you must supplement this instruction by becoming familiar with all the manuals and instructional material furnished with the trailer. If you feel that your new trailer requires additional conditioning or adjustment, please return it to your dealer as soon as possible.

Dealer's Responsibility

Your Starcraft RV, Inc. RV dealer is responsible for servicing claims under the terms of the warranty, but the dealer does not warrant the unit himself. He is responsible for pre-delivery inspection of new Starcraft RV, Inc. travel trailers and for the *Dealer Review* described below.

Owner's Responsibility

As the owner of a new Starcraft RV, Inc. travel trailer you are responsible for the proper maintenance and care of the unit. You should be familiar with the terms of Starcraft RV, Inc.'s warranty, especially any exclusions arising through misuse or failure to follow the instructions set forth in the Owner's Manual. Also, become familiar with appliance operating instructions found in the Owner's Packet.

Insurance Coverage

Make sure your unit is insured. Contact your insurance agent prior to picking up your unit for information concerning your policy coverage.

Dealer Review

At the time of delivery we recommend the following steps be taken:

1. Review the Owner's Manual with the dealer. If you have any questions, he has the expertise to answer them and will help you with anything you do not understand.
2. Go through the complete hookup procedure and inspect the unit for defects. Ask the dealer to make any adjustments you feel are necessary. Have the dealer demonstrate appliances and optional equipment and explain safety procedures. Make sure that you understand the operation of the trailer.

   If the dealer has not already done so, request that the dealer install the propane bottles and check all connections for leaks after the bottles have been filled. The propane regulator should be checked to make sure that it will deliver the correct pressure (11 inches of water column) to the propane appliances.
3. Ask the dealer about any safety and convenience items that he feels you might need, such as side mirrors, spare bulbs and fuses, water fill hoses, sewer hoses, and extension cords.

Customer Service

Please contact your dealer immediately if you have any questions regarding operation, maintenance, or service. Your Starcraft RV, Inc. Dealer will promptly handle any problems which might occur. Customer service is of utmost importance to your dealer and to Starcraft RV, Inc.. If you should encounter a problem that your dealer cannot handle to your satisfaction, please write:

Starcraft RV, Inc. Warranty Department
P.O. Box 458
Topeka, IN 46571

Product Changes

Because of Starcraft RV, Inc.'s ongoing program of product improvement, recent product changes may not be included in this Owner's Manual. Specifications were correct at the time of printing, but Starcraft RV, Inc. reserves the right to make product and supplier changes without incurring any obligation to alter existing units. As a result, the instructions included in this manual are intended only as a guide, and in no way extend the responsibilities of Starcraft RV, Inc. beyond warranty as presented in this manual.

Long Term Occupancy and Condensation

This product is designed for recreational use and short term occupancy. It is not designed or intended to be used as permanent housing. Use of this product for long term or permanent occupancy can lead to premature deterioration of interior finishes, fabrics, carpeting, and drapes. Damage or deterioration due to long term occupancy may not be considered normal and may, under the terms of the warranty, be considered as misuse, abuse, or neglect and may void the warranty completely or in part.

If you expect to occupy the trailer for an extended period, be prepared to encounter certain conditions such as condensation and humidity, especially in cold weather. Due to the compact living quarters of a recreational vehicle, the normal living activities of even a few occupants will lead to rapid moisture saturation of the air contained in the trailer.

Moisture can condense on the inside surfaces of your trailer during use in cold weather when the relative humidity of the interior air is high. This condition is increased because the insulated walls of the trailer are much thinner than house walls. Estimates show that a family of four can vaporize up to three gallons of water daily through breathing, cooking, bathing and washing. Unless this water vapor is carried outside by ventilation, or condensed by a dehumidifier, it will condense on the inside of the windows and walls as moisture, or in cold weather, as frost or ice. The water vapor may also condense out of sight within the walls or the ceiling where it will show up as warped or stained panels, indicating a potentially serious condensation problem. You should take action to minimize the effects of excessive moisture and condensation in your trailer when these signs appear.

NOTE: Interior moisture condensation can be reduced through the following:

Ventilate with outside air. Circulate outside air into the interior by opening one or more roof vents and one or more windows. This additional ventilation may increase the furnace heating load during cold weather. However, it will greatly reduce water condensation. Outside air ventilated to the inside will be far drier than interior air, even when it is raining or snowing, and will effectively reduce condensation inside the trailer.

Minimize moisture released inside the trailer. When cooking, run the range vent fan to carry water vapor out of the trailer. The same applies when bathing. Run the bath vent fan, or open the bath vent. Avoid making steam from excessive boiling or use of hot water. Keep the carpet dry at the entrance ways by removing wet shoes before entering. Avoid drying wet coats or clothes inside the trailer.

Towing Equipment Selection and Preparation for Towing

The selection and preparation of your towing equipment will have a great effect on the handling of your tow vehicle and the stability of your Starcraft RV, Inc. travel trailer. The following rules will help you select towing equipment with the capabilities your trailer requires and to operate that equipment in a safe and sensible manner.

WARNING: NEVER travel with a hitch setup that does not make the trailer and the tow vehicle level. Do not allow the hitch weight to overload the tow vehicle rear axle. Failure to comply could result in traffic hazard, poor handling, damage to the tow vehicle, or, failure of the trailer axle, tires and bearings. These resulting failures are not warrantable.

Use a tow vehicle that is equipped with heavy-duty running gear and that is powerful enough to pull your fully loaded trailer. The suspension of the tow vehicle must be strong enough to carry the hitch weight of the fully loaded trailer.

For Travel Trailers: Use a weight distributing hitch. To minimize rear overhang, mount the hitch as close to the rear bumper as possible. Follow the recommendations of both the tow vehicle and hitch manufacturers.

For Travel Trailers: Do not overtighten the weight distributing spring bars. Follow the hitch manufacturer's instructions and when in doubt, use the lighter spring bar setting.

For Travel Trailers: Use a sway control, either cam-type or friction, installed and adjusted in accordance with the manufacturer's instructions.

Use a brake control unit that allows you to apply the trailer brakes without operating the brakes of the tow vehicle as well as operating them automatically.

Adjust the brake control unit so that the trailer brakes come on as quickly as possible without sliding the tires of the fully loaded trailer under rapid braking conditions. The trailer brakes should come on slightly ahead of the tow vehicle brakes.

Inflate the rear tires of the tow vehicle and the travel trailer to their maximum cold pressure rating. Maximum pressure ratings are listed on the sides of the tires.

When loading the trailer, place heavy objects near the floor and as close as possible to the trailer axle(s). Do not place heavy objects on the rear bumper, in the bedroom area, or on the tongue.

Fill (or empty) the fresh water tank to minimize sloshing (liquid movement) to avoid changes in tongue weight when towing.

Load the trailer to comply with the tongue/hitch weight **specified by Starcraft RV, Inc.** Weigh the loaded trailer periodically to verify correct tongue/hitch weight.

• Do not exceed the Gross Vehicle Weight Ratings (GVWR) or the Gross Axle Weight Ratings (GAWR) listed for the travel trailer and the tow vehicle. Weigh the fully loaded trailer and tow vehicle periodically to verify that the weight ratings have not been exceeded.

TRAVEL TRAILER: Weight should be distributed equally from side-to-side and the tongue weight should be within 9-14% of the weight of the loaded trailer.

Hitches and Sway Controls

Because of the weight and the forces involved, the most critical piece of towing equipment required for travel trailer towing is probably the hitch. When purchasing a hitch, you should buy the one that is recommended by the manufacturer of your tow vehicle and that is matched to the size trailer that you intend to pull. You should know that there are two basic types of hitches; weight carrying and weight distributing. According to the size trailer you purchase, and the size of tow vehicle you intend to use, a weight distributing hitch may not be necessary. A weight carrying hitch may be adequate.

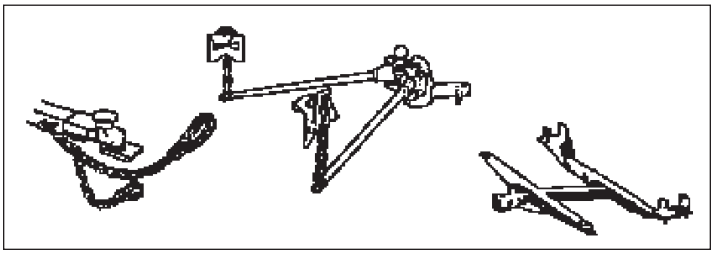
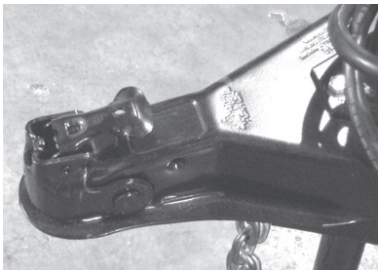


Fig. 1. Typical hitch components: (from left to right) hitch coupler and dual safety chains, weight distributing hitch, and custom hitch receiver.

Photograph 1. Hitch unlatched.



Photograph 2. Hitch latched.

Weight Carrying Hitches

Weight carrying hitches, either bumper or frame mounted, carry the tongue weight on the ball of the hitch and transmit this entire load to the rear axle of the tow vehicle. For this type of hitch to be appropriate, the rear end of the tow vehicle, including the structure to which the hitch is attached, the suspension and the tires must have the capacity to support, or carry, the entire hitch load. This load is also included as cargo load in the tow vehicle. See tow vehicle owner's manual.

Weight Distributing Hitches

Weight distributing (also called weight equalizing) hitches use leverage to distribute the tongue weight between the tow vehicle and the trailer itself, providing that the hitch is properly adjusted, and correctly rated for your tow vehicle/trailer combination.

Weight distributing hitches generally consist of two major assemblies; the hitch itself, with spring bars which provide the leverage to distribute the weight of the trailer, and the hitch receiver which attaches to the underside of the tow vehicle.

The decision whether or not to use a weight distributing hitch must be based on gross loaded weight, hitch weight and the capacity of the tow vehicle. DO NOT apply more spring bar pressure than is necessary to support the actual hitch weight. If two chain links are adequate, three are not better (for the A-frame, that is).

Hitch Classification

Hitches are classified by weight as follows:

Class 1 - No Expandables are in this class.

Class 2 - GVWR over 2000 lbs up to 3500 lbs.
Hitch weight 200 to 300 lbs.

Class 3 - GVWR over 3500 lbs. up to 5000 lbs.
Hitch weight 350 to 500 lbs.

Class 4 - GVWR over 5000 lbs. up to 10,000 lbs.
Hitch weight 500 to 1000 lbs.

Expandable GVWR and hitch requirements range from Class 2 through Class 4, depending on the model. While you may use a hitch in a higher class, never use one in a lower class.

NOTE: The tow vehicle must be rated (by its manufacturer) to tow both the loaded weight and the tongue weight of the trailer.

WARNING: DAMAGE CAUSED BY IMPROPER HITCH USAGE WILL NOT BE COVERED BY WARRANTY.

Sway Controls

Sway controls operate in conjunction with the trailer hitch and are used to reduce sway. There are two basic types; cam-action and friction. Your dealer can make recommendations concerning the best type for your outfit. Keep in mind that when towing smaller trailers with larger tow vehicles, sway controls may not be necessary.

NOTE: The couplers on Expandables are designed for use with 2-5/16" hitch balls on all Expandables. Use of a safety pin, a bolt and nut, or a padlock, in the hole provided in the coupler latch, is highly recommended while in transit to prevent unlatching from the tow vehicle hitch ball.

Driving Rules for Trailer Towing

Your car or truck will have very different handling and stopping characteristics when towing a travel trailer. The following rules will help you develop the driving skills needed for safe trailer towing:

If you are new to trailer towing, or are unfamiliar with the tow vehicle or trailer, drive cautiously until you have learned the handling and stopping characteristics of the tow vehicle/trailer combination.

Do not permit a driver who is inexperienced at towing to operate your trailer/vehicle without direct supervision. Beginners should be extra cautious.

- Tow at moderate speeds and allow for adverse highway and weather conditions. Do not exceed posted speed limits, even under the best conditions. As speed increases, trailer stability, stopping ability, and maneuverability are greatly reduced.
- Reduce speed for downgrades and use lower gears for long hills. Trailer stability is reduced while traveling downhill and stopping distance is increased because of the increased load (due to gravity) on the brakes.

Avoid continuous or frequent brake applications. The combined weight of tow vehicle and trailer can cause brakes to overheat and fade.

Reduce speed to improve trailer stability and handling under windy conditions. Trailer sway can be induced by crosswinds or the slipstream from passing vehicles, particularly trucks or buses overtaking from the rear.

Avoid quick steering or braking movements that could cause the trailer to start swaying.

If the trailer begins to sway, steer with small movements. Large, quick movements will increase trailer sway and may result in loss of control. Holding the steering wheel steady is the best method.

Slow down gradually and avoid hard braking. Use the brake control unit to apply the trailer brakes before braking the tow vehicle, but do not lock the brakes which will cause the tires to slide, and could cause the trailer to jackknife.

If a reduction in trailer stability occurs, reduce speed and stop as soon as you can safely do so. Check tire pressures, sway controls, hitch spring bar adjustments, and cargo distribution. Look for signs of mechanical failure. Travel at reduced speeds until the problem has been corrected.

Slow down to avoid hard braking on turns. Stability is reduced when cornering and the weight of the trailer can push the rear of the tow vehicle outward causing loss of control and possible jackknifing.

- Do not follow other vehicles closely. Allow at least twice the normal stopping distance to compensate for the added weight of the loaded trailer.
- Allow extra time for passing. It will take longer to accelerate to passing speed and more clearance will be needed because of the added length of the trailer.

Planning and Preparation

Check List

Before leaving the dealer's lot with your new Expandable, be sure that you understand or are able to perform the following:

- Prepare trailer and tow vehicle for towing
- Proper use of hitch, wiring harness, and safety chains
- Be familiar with the special driving safety rules
- Operate propane system
- Operate fresh water system
- Operate waste water system and holding tanks
- Operate electrical systems
- Operate appliances
- Convert lounge and dinette into beds
- Parking (including backing and leveling)

Your Starcraft RV, Inc. travel trailer was designed to give you many miles of trouble-free operation provided it is cared for and operated in a safe manner. Be sure that you understand the preceding items before you leave the dealer's lot with your Travel Trailer. Go through them as many times as you feel necessary.

BECOME FAMILIAR WITH THIS OWNER'S MANUAL! Study all the informational material and manufacturer's instructions packaged in the Owner's Information Kit. Know how to operate all the systems and appliances.

HEED ALL THE SAFETY WARNINGS LISTED IN THIS MANUAL AND THE MANUFACTURER'S LITERATURE! THEY COULD SAVE YOUR LIFE.

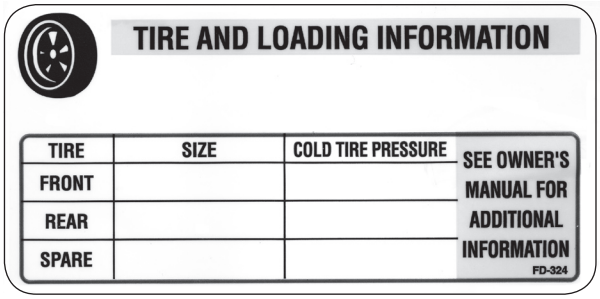
Tire Safety

NHTSA Hotline Number: 1-888-327-4236

This portion of the Owner's Manual contains tire safety information as required by 49 CFR 575.6.

Section 1, based in part on the National Highway Traffic Safety Administration's Brochure entitled "Tire Safety-Everything Rides On It," contains the following items:

- Tire labeling, including a description and explanation of each marking on the tires, and information about the DOT Tire Identification Number (TIN). (See sample below.)



- Recommended tire inflation pressure, including a description and explanation of:
  - A. Cold inflation pressure
  - B. Vehicle Placard and location on the vehicle
  - C. Adverse safety consequences of under inflation (including tire failure)
  - D. Measuring and adjusting air pressure for proper inflation.
- Tire Care, including maintenance and safety practices.
- Vehicle load limits, including a description and explanation of the following items:
  - A. Locating and understanding the load limit information, total load capacity, and cargo capacity
  - B. Calculating total and cargo capacities with varying seating configurations, including quantitative examples showing/illustrating how the vehicle's cargo and luggage capacity decreases as combined number and size of occupants increases. This item is also discussed in Section 3
  - C. Determining compatibility of tire and vehicle load capabilities.
  - D. Adverse safety consequences of overloading on handling and stopping on tires.

Section 2 contains "Steps for Determining Correct Load Limit"

Section 3 contains a Glossary of Tire Terminology, including "cold inflation pressure", "maximum inflation pressure", "recommended inflation pressure", and other non-technical terms.

SECTION I

The National Traffic Safety Administration (NHTSA) has published a brochure (DOT HS 809 361) that discusses all aspects of Tire Safety, as required by CFR 575.6. This brochure is reproduced in part below. It can be obtained and downloaded from NHTSA, free of charge, from the following web site:

http://www.nhtsa.dot.gov/cars/rules/TireSafety/ridesonit/tires_index.html

Studies of tire safety show that maintaining proper tire pressure, observing tire and vehicle load limits (not carrying more weight in your vehicle than your tires or vehicle can safely handle), avoiding road hazards, and inspecting tires for cuts, slashes, and other irregularities are the most important things you can do to avoid tire failure, such as tread separation or blowout and flat tires. These actions, along with other care and maintenance activities, can also:

- Improve vehicle handling
- Help protect you and others from avoidable breakdowns and accidents
- Improve fuel economy
- Increase the life of your tires.

This booklet presents a comprehensive overview of tire safety, including information on the following topics:

- Basic tire maintenance
- Uniform Tire Quality Grading System
- Fundamental characteristics of tires
- Tire safety tips.

Use this information to make tire safety a regular part of your vehicle maintenance routine. Recognize that the time you spend is minimal compared with the inconvenience and safety consequences of the flat tire or other failure.

Safety First – Basic Tire Maintenance

Properly maintained tires improve the steering, stopping, traction, and load-carrying capability of your vehicle. Underinflated tires and overloaded vehicles are a major cause of tire failure. Therefore, as mentioned above, to avoid flat tires and other types of tire failure, you should maintain proper tire pressure, observe tire and vehicle load limits, avoid road hazards, and regularly inspect your tires.

Finding Your Vehicle's Recommended Tire Pressure and Load Limits

Tire information placards and vehicle certification labels contain information on tires and load limits. These labels indicate the vehicle manufacturer's information including:

- Recommended tire size

- Recommended tire inflation pressure
- Vehicle capacity weight (VCW-the maximum occupant and cargo weight a vehicle is designed to carry)
- Front and rear gross axle weight ratings (GAWR – the maximum weight the axle systems are designed to carry).

Both placards and certification labels are permanently attached to the trailer on the forward half of the left side, and are easily readable from outside the vehicle without moving any part of the vehicle. You can also find the recommended tire pressure and load limit for your vehicle in the vehicle owner's manual.

Understanding Tire Pressure and Load Limits

Tire inflation pressure is the level of air in the tire that provides it with load-carrying capacity and affects the overall performance of the vehicle. The tire inflation pressure is a number that indicates the amount of air pressure measured in pounds per square inch (psi) – a tire requires to be properly inflated. (You will also find this number on the vehicle information placard expressed in kilopascals (kPa), which is the metric measure used internationally.)

Vehicle manufacturers determine this number based on the vehicle's design load limit, that is, the greatest amount of weight a vehicle can safely carry and the vehicle's tire size. The proper tire pressure for your vehicle is referred to as the "recommended cold inflation pressure". (As you will read below, it is difficult to obtain the recommended tire pressure if your tires are not cold.)

Because tires are designed to be used on more than one type of vehicle, tire manufacturers list the "maximum permissible inflation pressure" on the tire sidewall. This number is the greatest amount of air pressure that should ever be put in the tire under normal driving conditions.

Checking Tire Pressure

It is important to check your vehicle's tire pressure at least once a month for the following reasons

- Most tires may naturally lose air over time
- Tires can lose air suddenly if you drive over a pothole or other object or if you strike the curb when parking
- With radial tires, it is usually not possible to determine underinflation by visual inspection.

For convenience, purchase a tire pressure gauge to keep in your vehicle. Gauges can be purchased at tire dealerships, auto supply stores, and other retail outlets.

The recommended tire inflation pressure that vehicle manufacturers provide reflects the proper psi when a tire is cold. The term cold does not relate to the outside temperature. Rather, a cold tire is one that has not been driven on for at least three hours. When you drive, your tires get warmer, causing the air pressure within them to increase. Therefore, to get an accurate tire pressure reading, you must measure tire pressure when the tires are cold or compensate for the extra pressure in warm tires.

Steps for Maintaining Proper Tire Pressure

- Step 1: Locate the recommended tire pressure on the vehicle's tire information placard, certification label, or in the owner's manual
- Step 2: Record the tire pressure of all tires
- Step 3: If the tire pressure is too high in any of the tires, slowly release air by gently pressing on the tire valve stem with the edge of your tire gauge until you get to the correct pressure
- Step 4: If the tire pressure is too low, note the difference between the measured tire pressure and the correct tire pressure. These "missing" pounds of pressure are what you will need to add
- Step 5: At a service station, add the missing pounds of air pressure to each tire that is underinflated
- Step 6: Check all the tires to make sure they have the same air pressure (except in cases in which the front and rear tires are supposed to have different amounts of pressure).

If you have been driving your vehicle and think that a tire is underinflated, fill it to the recommended cold inflation pressure indicated on your vehicle's tire information placard or certification label. While your tire may still be slightly underinflated due to the extra pounds of pressure in the warm tire, it is safer to drive with air pressure that is slightly lower than the vehicle manufacturer's recommended cold inflation pressure than to drive with a significantly underinflated tire. Since this is a temporary fix, don't forget to recheck and adjust the tire's pressure when you can obtain a cold reading.

Tire Size

To maintain tire safety, purchase new tires that are the same size as the vehicle's original tires or another size recommended by the manufacturer. Look at the tire information placard, the owner's manual, or the sidewall of the tire you are replacing to find this information. If you have any doubt about the correct size to choose, consult with the tire dealer.

Tire Tread

The tire tread provides the gripping action and traction that prevent your vehicle from slipping or sliding, especially when the road is wet or icy. In general, tires are not safe and should be replaced when the tread is worn down to 1/16 of an inch. Tires have built-in treadwear indicators that let you know when it is time to replace your tires. These indicators are raised sections spaced intermittently in the bottom of the tread grooves. When they appear "even" with the outside of the tread, it is time to replace your tires. Another method for checking tread depth is to place a penny in the tread with Lincoln's head upside down and facing you. If you can see the top of Lincoln's head, you are ready for new tires.

Tire Balance and Wheel Alignment

To avoid vibration or shaking of the vehicle when a tire rotates, the tire must be properly balanced. This balance is achieved by positioning weights on the wheel to counterbalance heavy spots on the wheel-and-tire assembly. A wheel alignment adjusts the angles of the wheels so that they are positioned correctly relative to the vehicle's frame. This adjustment maximizes the life of your tires. These adjustments require special equipment and should be performed by a qualified technician.

Tire Repair

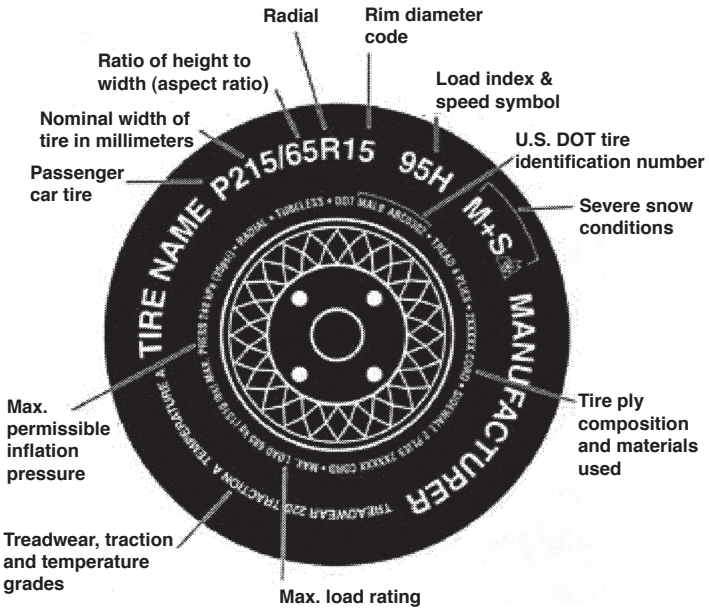
The proper repair of a punctured tire requires a plug for the hole and a patch for the area inside the tire that surrounds the puncture hole. Punctures through the tread can be repaired if they are not too large, but punctures to the sidewall should not be repaired. Tires must be removed from the rim to be properly inspected before being plugged and patched.

Tire Fundamentals

Federal law requires tire manufacturers to place standardized information on the sidewall of all tires. This information identifies and describes the fundamental characteristics of the tire and also provides a tire identification number for safety standard certification and in case of a recall.

Information on Passenger Vehicle Tires

Please refer to the diagram below:


Radial
Rim diameter code
Ratio of height to width (aspect ratio)
Load index & speed symbol
Nominal width of tire in millimeters
U.S. DOT tire identification number
Passenger car tire
Severe snow conditions
TIRE NAME P215/65R15 95H M+S MANUFACTURER
Max. permissible inflation pressure
Tire ply composition and materials used
Treadwear, traction and temperature grades
Max. load rating

P – The "P" indicates the tire is for passenger vehicles.

NOTE: Passenger car tires are not recommended for use on trailers, because the capacity ratings are not marked on the side walls of these tires. In the event a passenger car tire is used, the capacity must be derated by 10%.

Next Number – This three-digit number gives the width in millimeters of the tire from sidewall edge to sidewall edge. In general, the larger the number, the wider the tire.

Next Number – This two-digit number, known as the aspect ratio, gives the tire's ratio of height to width. Numbers of 70 or lower indicate a short sidewall for improved steering response and better overall handling on dry pavement.

R – The "R" stands for radial. Radial ply construction of tires has been the industry standard for the past 20 years.

Next Number – This two-digit number is the wheel or rim diameter in inches. If you change your wheel size, you will have to purchase new tires to match the new wheel diameter.

Next Number – This two- or three-digit number is the tire's load index. It is a measurement of how much weight each tire can support. You may find this information in your owner's manual. If not, contact a local tire dealer. Note: You may not find this information on all tires because it is not required by law.

M+S – The "M+S" or "M/S" indicates that the tire has some mud and snow capability. Most radial tires have these markings.

Speed Rating – The speed rating denotes the speed at which a tire is designed to be driven for extended periods of time. The ratings range from 99 miles per hour (mph) to 186 mph. These ratings are listed below. Note: You may not find this information on all tires because it is not required by law.

Letter Rating	Speed Rating
Q	99 mph
R	106 mph
S	112 mph
T	118 mph
U	124 mph
H	130 mph
V	149 mph
W	168* mph
Y	186* mph

* For tires with a maximum speed capability over 149 mph, tire manufacturers sometimes use the letters ZR. For those with a maximum speed capability over 186 mph, tire manufacturers always use the letters ZR.

U.S. DOT Tire Identification Number – This begins with the letters "DOT" and indicates that the tire meets all federal standards. The next two numbers or letters are the plant code where it was manufactured, and the last four numbers represent the week and year the tire was built. For example, the numbers 3197 means the 31st week of 1997. The other numbers are marketing codes used at the manufacturer's discretion. This information is used to contact consumers if a tire defect requires a recall.

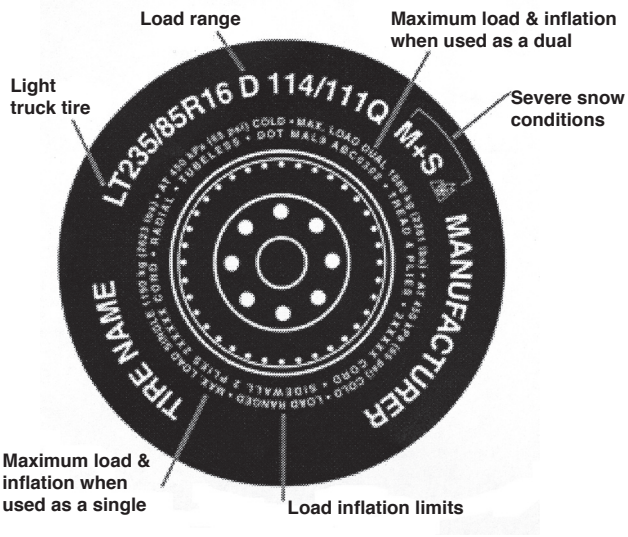
Tire Ply Composition and Materials Used – The number of plies indicates the number of layers of rubber-coated fabric in the tire. In general, the greater the number of plies, the more weight a tire can support. Tire manufacturers also must indicate the materials in the tire, which include steel, nylon, polyester, and others.

Maximum Load Rating – This number indicates the maximum load in kilograms and pounds that can be carried by the tire.

Maximum Permissible Inflation Pressure – This number is the greatest amount of air pressure that should ever be put in the tire under normal driving conditions.

Additional Information on Light Truck Tires

Please refer to the following diagram:


Load range
Maximum load & inflation when used as a dual
Light truck tire
Severe snow conditions
LT235/85R16 D 114/111Q M+S
TIRE NAME
MANUFACTURER
Maximum load & inflation when used as a single
Load inflation limits

Tires for light trucks have other markings besides those found on the sidewalls of passenger tires.

LT – The "LT" indicates the tire is for light trucks or trailers.

ST – An "ST" is an indication the tire is for trailer use only.

Max. Load Dual kg (lbs) at kPa (psi) Cold – This information indicates the maximum load and tire pressure when the tire is used as a dual; that is, when four tires are put on each rear axle (a total of six or more tires on the vehicle).

Max. Load Single kg (lbs) at kPa (psi) Cold – This information indicates the maximum load and tire pressure when the tire is used as a single.

Load Range – This information identifies the tire's load-carrying capabilities and its inflation limits.

Vehicle Load Limits

Determining the load limits of a vehicle includes more than understanding the load limits of the tires alone.

On a trailer, there is a Federal certification label located on the forward half of the left (road) side of the unit.

The certification label will indicate the vehicle's gross vehicle weight rating (GVWR). This is the most weight the fully loaded vehicle can weigh. It will also provide the gross axle weight rating (GAWR). This is the most a particular axle can weigh. If there are multiple axles, the GAWR of each axle will be provided.

In the same location as the certification label described above, there is a vehicle placard. This placard provides tire and loading information. In addition, this placard will show a statement regarding maximum cargo capacity.

Cargo Capacity

Cargo can be added to the vehicle, up to the maximum weight specified on the placard and, the total weight of the fully loaded vehicle cannot exceed the stated GVWR or GAWR.

Water and propane also need to be considered. The weight of fully filled propane containers is considered part of the weight of the RV before it is loaded with cargo and is not considered part of the disposable cargo load. Water, however, is a cargo weight and is treated as such. If there is a fresh water storage tank of 100 gallons, this tank, when filled, would weigh about 800 pounds. If more cargo is being transported, water can be off-loaded to keep the total amount of cargo added to the vehicle within the limits of GVWR so as not to overload the vehicle. Understanding this flexibility will allow you, the owner, to make choices that fit your travel and camping needs.

When loading your cargo, be sure it is distributed evenly to prevent overloading front to back and side to side. Heavy items should be placed low as close to the axle positions as reasonable. Too many items on one side may overload a tire. The best way to know the actual weight of the vehicle is to weigh it at a public scale. Talk to your RV dealer to discuss the weighing methods needed to capture the various weights related to the RV. This would include weights for the following: axles, wheels, hitch or pin (in the case of a trailer) and total weight.

How Overloading Affects Your RV and Tires

The results of overloading can have serious consequences for passenger safety. Too much weight on your vehicle's suspension system can cause spring, shock absorber, or brake failure, handling or steering problems, irregular tire wear, tire failure or other damage.

An overloaded vehicle is hard to drive and hard to stop. In case of serious overloading, brakes can fail completely, particularly on steep hills. The load a tire will carry safely is a combination of the size of tire, its load range, and corresponding inflation pressure.

Excessive loads and/or underinflation cause tire overloading and, as a result, abnormal tire flexing occurs. This situation can generate an excessive amount of heat within the tire. Excessive heat may lead to tire failure.

It is the air pressure that enables a tire to support the load, so proper inflation is critical. Since RVs can be configured and loaded in many ways, air pressures must be determined from actual loads (determined by weighing) and taken from the load and inflation tables provided by the tire manufacturer. These air pressures may differ from those found on the certification label. However, they should never exceed the tire limitation for load or air pressure. If you discover that your tires cannot support the actual weights, the load will need to be lightened.

Tire Safety Tips

Preventing Tire Damage

- Slow down if you have to go over a pothole or other object in the road
- Do not run over curbs or other foreign objects in the roadway, and try not to strike the curb when parking.

Tire Safety Checklist

- Check tire pressure regularly (at least once a month), including the spare
- Inspect tires for uneven wear patterns on the tread, cracks, foreign objects, or other signs of wear or trauma
- Remove bits of glass and foreign objects wedged in the tread
- Make sure your tire valves have valve caps
- Check tire pressure before going on a long trip
- Do not overload your vehicle. Check the Tire Information and Loading Placard or User's Manual for the maximum recommended load for the vehicle.

SECTION 2 [Trailers only]

Steps for Determining Correct Load Limit

1. Locate the statement. The weight of cargo should never exceed XXX kg or XXX lbs on your vehicle's placard
2. This figure equals the available amount of cargo and luggage load capacity
3. Determine the combined weight of luggage and cargo being loaded on the vehicle. That weight may not safely exceed the available cargo and luggage load capacity.

SECTION 3

Glossary of Tire Terminology

Accessory weight – The combined weight (in excess of those standard items which may be replaced) of automatic transmission, power steering, power brakes, power windows, power seats, radio and heater, to the extent that these items are available as factory-installed equipment (whether installed or not).

Bead – The part of the tire that is made of steel wires, wrapped or reinforced by ply cords and that is shaped to fit the rim.

Bead separation – This is the breakdown of the bond between components in the bead.

Bias ply tire – A pneumatic tire in which the ply cords that extend to the beads are laid at alternate angles substantially less than 90 degrees to the center line of the tread.

Carcass – The tire structure, except tread and sidewall rubber which, when inflated, bears the load.

Chunking – The breaking away of pieces of the tread or sidewall.

Cold inflation pressure – The pressure in the tire before you drive.

Cord – The strands forming the plies in the tire.

Cord Separation – The parting of cords from adjacent rubber compounds.

Cracking – Any parting within the tread, sidewall, or inner liner of the tire extending to cord material.

CT – A pneumatic tire with an inverted flange tire and rim system in which the rim is designed with rim flanges pointed

radially inward and the tire is designed to fit on the underside of the rim in a manner that encloses the rim flanges inside the air cavity of the tire.

Curb weight – The weight of motor vehicle with standard equipment, including the maximum capacity of fuel, oil, and coolant, and, if so equipped, air conditioning and additional weight optional engine.

Extra load tire – A tire designed to operate at higher loads and at higher inflation pressure than the corresponding standard tire.

Groove – The space between two adjacent tread ribs.

Gross Vehicle Weight Rating (GVWR) – The maximum permissible weight of this fully loaded vehicle.

Gross Axle Weight Rating (GAWR) – The value specified as the load carrying capacity of a single axle system, as measured at the tire-ground interfaces.

Hitch Weight – The vertical trailer load supported by the hitch ball.

Innerliner – The layer(s) forming the inside surface of a tubeless tire that contains the inflating medium within the tire.

Innerliner separation – The parting of the innerliner from cord material in the carcass.

Intended outboard sidewall – The sidewall that contains a white-wall, bears white lettering or bears manufacturer, brand, and/or model name molding that is higher or deeper than the same molding on the other sidewall of the tire or the outward facing sidewall of an asymmetrical tire that has a particular side that must always face outward when mounted on a vehicle.

Light truck (LT) tire – A tire designated by its manufacturer as primarily intended for use on lightweight trucks or multipurpose passenger vehicles.

Load rating – The maximum load that a tire is rated to carry for a given inflation pressure.

Maximum load rating – The load rating for a tire at the maximum permissible inflation pressure for that tire.

Maximum permissible inflation pressure – The maximum cold inflation pressure to which a tire may be inflated.

Maximum loaded vehicle weight – The sum of curb weight, accessory weight, vehicle capacity weight, and production options weight.

Measuring rim – The rim on which a tire is fitted for physical dimension requirements.

Non-pneumatic rim – A mechanical device which, when a non-pneumatic tire assembly incorporates a wheel, supports the tire, and attaches, either integrally or separably, to the wheel center member and upon which the tire is attached.

Non-pneumatic spare tire assembly – A non-pneumatic tire assembly intended for temporary use in place of one of the pneumatic tires and rims that are fitted to a passenger car in compliance with the requirements of this standard.

Non-pneumatic tire – A mechanical device which transmits, either directly or through a wheel or wheel center member, the vertical load and tractive forces from the roadway to the vehicle, generates the tractive forces that provide the directional control of the vehicle and does not rely on the containment of any gas or fluid for providing those functions.

Non-pneumatic tire assembly – A non-pneumatic tire, alone or in combination with a wheel or wheel center member, which can be mounted on a vehicle.

Normal occupant weight – This means 68 kilograms (150 lbs.) times the number of occupants specified in the second column of Table I of 49 CFR 571.110.

Occupant distribution – The distribution of occupants in a vehicle as specified in the third column of Table I of 49 CFR 571.110.

Open splice – Any parting at any junction of tread, sidewall, or innerliner that extends to cord material.

Outer diameter – The overall diameter of an inflated new tire.

Overall width – The linear distance between the exteriors of the sidewalls of an inflated tire, including elevations due to labeling, decorations, or protective bands or ribs.

Pin Weight – The vertical trailer load supported by the king pin of a fifth wheel hitch.

Ply – A layer of rubber-coated parallel cords.

Ply separation – A parting of rubber compound between adjacent plies.

Pneumatic tire – A mechanical device made of rubber, chemicals, fabric and steel or other materials that, when mounted on an automotive wheel, provides the traction and contains the gas or fluid that sustains the load.

Production options weight – The combined weight of those installed regular production options weighing over 2.3 kilograms (5 lbs.) in excess of those standard items which they replace, not previously considered in curb weight or accessory weight, including heavy duty brakes, ride levelers, roof rack, heavy duty battery, and special trim.

Radial ply tire – A pneumatic tire in which the ply cords that extend to the beads are laid at substantially 90 degrees to the centerline of the tread.

Recommended inflation pressure – This is the inflation pressure provided by the vehicle manufacturer on the Tire Information label and on the Certification / VIN tag.

Reinforced tire – A tire designed to operate at higher loads and at higher inflation pressures than the corresponding standard tire.

Rim – A metal support for a tire or a tire and tube assembly upon which the tire beads are seated.

Rim diameter – This means the nominal diameter of the bead seat.

Rim size designation – This means the rim diameter and width.

Rim type designation – This means the industry of manufacturers' designation for a rim by style or code.

Rim width – This means the nominal distance between rim flanges.

Section width – The linear distance between the exteriors of the sidewalls of an inflated tire, excluding elevations due to labeling, decoration, or protective bands.

Sidewall – That portion of a tire between the tread and bead.

Sidewall separation – The parting of the rubber compound from the cord material in the sidewall.

Test rim – The rim on which a tire is fitted for testing, and may be any rim listed as appropriate for use with that tire.

Tread – That portion of a tire that comes into contact with the road.

Tread rib – A tread section running circumferentially around a tire.

Tread separation – Pulling away of the tread from the tire carcass.

Treadwear indicators (TWI) – The projections within the principal grooves designed to give a visual indication of the degrees of wear of the tread.

Vehicle capacity weight – The rated cargo and luggage load plus 68 kilograms (150 lbs.) times the vehicle's designated seating capacity.

Vehicle maximum load on the tire – The load on an individual tire that is determined by distributing to each axle its share of the maximum loaded vehicle weight and dividing by two.

Vehicle normal load on the tire – The load on an individual tire that is determined by distributing to each axle its share of the curb weight, accessory weight, and normal occupant weight (distributed in accordance with Table I of CFT 49 571.110) and dividing by two.

Weather side – The surface area of the rim not covered by the inflated tire.

Wheel center member – In the case of a non-pneumatic tire assembly incorporating a wheel, a mechanical device which attaches, either integrally or separably,0 to the non-pneumatic rim and provides the connection between the non-pneumatic rim and the vehicle; or, in the case of a non-pneumatic tire assembly not incorporating a wheel, a mechanical device which attaches, either integrally or separably, to the non-pneumatic tire and provides the connection between tire and the vehicle.

Wheel-holding fixture – The fixture used to hold the wheel and tire assembly securely during testing.

Weight Ratings and Weight Distribution

Cargo carrying capacity for your unit is defined on a weight label placed in your unit. See sample of weight label. Refer to the label contained in your unit for specific weight information pertaining to your unit. This weight label is affixed on the inside of a cabinet door. (See Sample of Weight Label.)

On the driver's side of the trailer toward the front end, is the Federal weight tag which gives additional weight information, plus, tire size and load information and VIN (Vehicle Identification number).

NOTE: While every effort is made to provide an accurate weight, it is possible that the weight of your specific unit may vary from the weight shown on the label.

Weight Rating Definitions

Gross Axle Weight Rating (GAWR) - The weight specified by the vehicle manufacturer as the maximum load carrying capacity of a single axle system, as measured at the tire-ground interfaces.

THIS VEHICLE CONFORMS TO ALL APPLICABLE FEDERAL MOTOR VEHICLE SAFETY STANDARDS IN EFFECT ON THE DATE OF MANUFACTURE SHOWN ABOVE	MANUFACTURED BY: Starcraft RV, Inc.	DATE: 12/1999	
	FRONT	REAR	
	2500 LBS/ 1134 KG	2500 LBS/ 1134 KG	GAWR
GVWR	ST175/80R13C	ST175/80R13C	TIRES
4990 LBS	4.5X13 JJ	4.5X13 JJ	RIMS
2263 KG	50 PSI / 345 KPA	50 PSI / 345 KPA	COLD
VEHICLE I.D. NUMBER 1SABS02M9Y1EM8520			TYPE: TRAILER

Federal weight sticker, which lists GVWR, GAWR, tire size and load range, and recommended tire pressure.

TRAILER WEIGHT INFORMATION:	CONSULT OWNER'S MANUAL FOR SPECIFIC WEIGHING INSTRUCTIONS AND TOWING GUIDELINES
MODEL	
UVW GVWR	NCC
VIN	

THIS TRAILER IS CAPABLE OF CARRYING UP TO _____ GAL.

OF FRESH WATER (INCLUDING WATER HEATER) FOR A TOTAL OF _____ LBS.

REFERENCE: WEIGHT OF FRESH WATER IS 8.33 LBS/GAL; WEIGHT OF PROPANE IS 4.2 LBS./GAL. (AVERAGE).

GVWR – GROSS VEHICLE WEIGHT RATING MEANS THE MAXIMUM PERMISSIBLE WEIGHT OF THIS TRAILER. THE GVWR IS EQUAL TO OR GREATER THAN THE SUM OF THE UNLOADED VEHICLE WEIGHT PLUS THE NET CARRYING CAPACITY.

UVW – UNLOADED VEHICLE WEIGHT MEANS THE WEIGHT OF THIS TRAILER AS BUILT AT THE FACTORY. IF APPLICABLE, IT INCLUDES FULL GENERATOR FUEL, ENGINE OIL AND COOLANTS. THE UVW DOES NOT INCLUDE CARGO, FRESH WATER, PROPANE OR DEALER INSTALLED ACCESSORIES.

NCC – NET CARRYING CAPACITY MEANS THE MAXIMUM WEIGHT OF ALL PERSONAL BELONGINGS, FOOD, FRESH WATER, PROPANE, TOOLS, DEALER INSTALLED ACCESSORIES, ETC. THAT CAN BE CARRIED BY THIS TRAILER. (NCC IS EQUAL TO OR LESS THAN GVWR MINUS UVW).

Sample of Weight Label

Gross Combination Weight Rating (GCWR) - Means the maximum permissible loaded weight of the fully loaded towing vehicle including passengers (for motorized products 150 pounds each), all cargo, fluids, etc., plus the weight of the fully loaded towed vehicle.

Gross Vehicle Weight Rating (GVWR) - Means the maximum permissible weight of the trailer. The GVWR is equal to or greater than the sum of the unloaded vehicle weight plus the net carrying capacity. (In other words, the combined total of UVW and NCC can never exceed GVWR. If it does, the axles and tires will be overloaded, and any problems that develop, as a result, will not be covered by warranty.)

Unloaded Vehicle Weight (UVW) - Means the weight of the trailer as built at the factory. If applicable, it includes full generator fuel, engine oil, and coolants. The UVW does not include cargo, fresh water, propane, or dealer installed accessories.

Net Carrying Capacity (NCC) - Means the maximum weight of all personal belongs, food, fresh water, propane, tools, dealer installed accessories, etc., that can be carried by the trailer. NCC is equal to, or less than, GVWR minus UVW tongue or hitch weight.

Following are a couple simple formulas to express the above:

UVW + NCC = GVWR

GVWR - UVW = NCC

Tongue or Hitch Weight

The tongue weight is measured at the front of the trailer, underneath the hitch coupler. On tandem axle travel trailers, such as those manufactured by Starcraft RV, Inc., the tongue weight should be between 9-14% of the weight of the loaded travel trailer.

WARNING: DO NOT tow a travel trailer that has a tongue weight more than that recommended by Starcraft RV, Inc. Damage to the trailer frame, poor handling and braking, and reduced cornering capacity can result.

Weight Distribution

This is simply the location of weight in the trailer. You will be most concerned with "variable or moveable" weights such as fresh water and waste liquids, propane, personal belongings, foodstuffs, canned goods, etc., which can be moved around inside the trailer to change the weight distribution. Proper weight distribution will insure that the trailer is loaded evenly from side-to-side and that the tongue weight is correct.

Determining Load Capacity of Travel Trailer

Your vehicle will have basic weight information located on a sticker on the inside kitchen cabinet door. However the carrying capacity of your trailer can be determined by actually weighing the trailer when it is empty and subtracting this weight from the trailer's GVWR. This will tell you how much cargo you can load into the trailer for your trip.

The first thing to do is locate a set of scales big enough to accommodate the weight of your trailer. Your State Police probably operate a weigh station within easy driving distance; grain mills, gravel pits, ready-mix cement operations, and truck depots usually have a large set of scales and may be willing, for a nominal fee, or as a service, to weigh your travel trailer.

Once you have located a set of scales, weigh the trailer with all the tires and the tongue on the scale. This will give you the actual weight of the trailer. The difference between the actual weight and the GVWR will be the carrying capacity of your trailer.

Now, if you take the trouble to weigh everything before you pack it away in the trailer you should be able to get close to the load capacity of the trailer without going over. Don't forget to allow for the weight of the propane and fresh water which weighs approximately 8 LBS per gallon. However, you still need to weigh the loaded trailer to determine the tongue weight.

Side-To-Side Weight Distribution

Side-to-side weight distribution can be determined by weighing the trailer with the tires of just one side on the scales at a time. The tongue should be off the scales and the trailer should be level. Use the post under the coupler.

If the two measurements are not approximately equal, move things around inside the trailer until they are.

NOTE: After going through these procedures several times, you will probably come to the realization that designating specific storage areas, especially for large heavy items, is a good idea. A few labels on storage compartment doors will ensure proper storage of items.

Determining Load Distributing Hitch Adjustments

Because of the action of a load distributing hitch, it is necessary to weigh the loaded Travel Trailer and the tow vehicle to determine if the weight rating of either unit has been exceeded.

If the spring bars have been adjusted incorrectly they can cause changes in weight distribution which can in turn cause the GAWR to be exceeded.

Proceed as follows: Drive onto the scales with the trailer hitched up and the hitch adjusted according to the manufacturer's instruction. Tow vehicle and trailer should be fully loaded with passengers, fuel, water, etc. Take a reading with just the front tires (A) of the tow vehicle on the scales. This reading will tell you if the front axle, GAWR, of the tow vehicle has been exceeded.

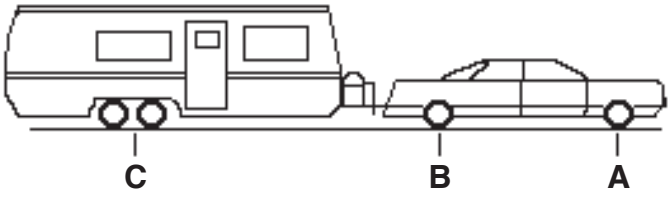
Then, pull ahead until rear tires (B) of the tow vehicle are also on the scales. This will tell you the loaded weight of the tow vehicle. This figure must not exceed the tow vehicle's GVWR.

To determine the load on the rear axle (including the tongue weight of the trailer), subtract the first reading from the second.

NOTE: Adjust your weight distributing hitch in accordance with the manufacturer's instruction.

Finally, pull ahead until the tires of the travel trailer (C) are on the scales along with both axles of the tow vehicle. Subtracting the second reading from this reading will give the load on the trailer axles which must not exceed the total trailer axle GAWR.

NOTE: Weigh your loaded vehicle and trailer periodically to make sure that trailer loadings and weight ratings have not been exceeded.



Weigh points which are used to determine axle weight and total weight of travel trailer and tow vehicle.

Tow Vehicle

Since the tow vehicle is an important part of your towing package, it must be loaded and weighed with the same care and consideration given the travel trailer itself. American made vehicles will be equipped with Gross Weight Rating stickers located on the driver's side near the door post. Refer to the tow vehicle owners manual for detailed information on towing and weight/cargo capacities for the tow vehicle and the vehicle/trailer combination.

Your tow vehicle must be rated by its manufacturer to handle both the gross weight and the tongue weight of the loaded trailer. A typical towing package consisting of heavy-duty rear springs, radiator, alternator, battery, shock absorbers, and transmission cooler can be purchased for your tow vehicle. Tires with the loaded carrying capacity to carry the added (hitch) weight must be used.

Learn all you can about the Starcraft RV you are planning to purchase. Get the facts about the actual trailer length, width, unloaded weight with options, GVWR and cargo carrying capacity. These are valuable pieces of information you should know when choosing an RV. This information is available in the manufacturer's sales literature or from the cargo carrying capacity label located in each trailer.

Verify the towing capacity of your tow vehicle. If you don't know, or aren't sure, ask your automotive dealership. Be sure to match its tow rating to the loaded (not dry) weight of your trailer (GVWR). Include the weight of water, LP gas, additional accessories, clothing, food and gear. Be sure the weight of the tow vehicle plus the weight of your trailer **do not** exceed the GVWR of the tow vehicle.

Traveling

Safe Towing

The single most important factor affecting safe towing is vehicle speed. SLOW DOWN! Especially if you are an inexperienced tow vehicle driver, or if you are towing a trailer you are not familiar with. High speeds reduce towing stability and increase stopping distances. Reduced towing stability can be recognized by the tendency of the trailer to sway from side-to-side after sudden steering maneuvers, in cross winds, or when being passed by large vehicles.

If swaying occurs, use the hand lever on the brake controller to apply the trailer brakes gradually, stabilizing the trailer and reducing speed until you can stop safely and make any necessary changes in weight distribution, hitch adjustments, or tire pressures.

Backing Up

If you are not already skilled at backing with a travel trailer attached, here is a hint that may help you while you are learning:

Place your hand at the bottom of the steering wheel. Moving your hand to the left, or clockwise, will cause the trailer to go to the left. Moving your hand to the right, or counterclockwise, causes the trailer to move in that direction.

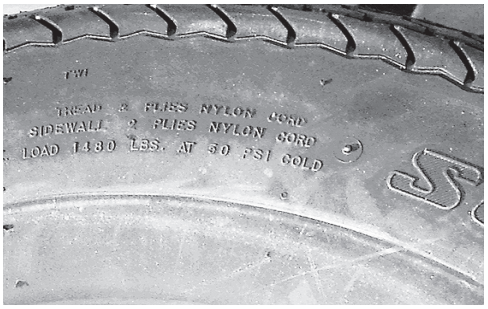
Mirrors

Many states require the use of mirrors when towing a large trailer that obstructs rearward vision. Mirrors should extend far enough to the sides to give a clear view on either side of tow vehicle and trailer.

Tires

Starcraft RV, Inc. travel trailers are equipped with first line quality tires made by a major manufacturer. To insure safety, towing stability, and maximum tire life the correct tire pressure must be maintained. Be sure that a working pressure gauge is part of your tool kit. Tire pressures should be checked cold before starting out. You can find the tire capacity and required pressure on the tire sidewall. See photos below. Tire pressure is also stated on the federal weight tag on the roadside front side of trailer. See page 15.

Keep the rear tires of your tow vehicle inflated to the maximum recommended pressure which will help to improve towing stability. Check tire pressures frequently and do it before starting when the tires are cold. As the tires heat up with traveling, tire pressures will normally increase so do not check tire pressure or bleed air from "hot" tires.



Photograph 3. Tire load ranges and inflation specifications are found on the sidewall of the tire.

Star Stream Spare Tire

The Star Stream series spare tire is mounted under the A-frame of the trailer. An automotive style winch and cable is used to lower and raise the spare tire.

Photograph 3a.

Changing Wheels/Tires

When removing a wheel, jack the trailer under the main beam of the frame. Do not jack against the axle beams. Jack against the frame only. When remounting the wheels, be sure to torque the wheel nuts and check them as instructed in the next paragraph.

Wheel Nuts

On new trailers, wheel lug nuts should be torqued with a torque wrench according to wheel size as listed in Fig. 17a. On your first trip, check wheel nut tightness at 10, 25 and 50 miles. Check periodically thereafter. Re-torque wheel lug nuts every 3000 miles. Wheels that come off, due to loose wheel nuts, is not a warranty matter. Checking wheel lug nut torque is the responsibility of the owner and/or dealer.

Wheel Size	Torque Sequence 1st Stage	2nd Stage	3rd Stage
12"	20-25	35-40	50-75
13"	20-25	35-40	50-75
14"	20-25	50-60	90-120
15"	20-25	50-60	90-120
16"	20-25	50-60	90-120

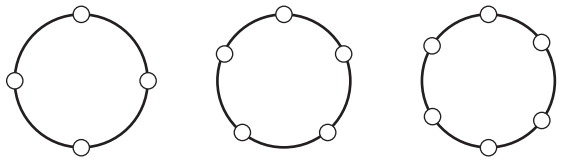


Fig 17a.

Safety Chains

Your Starcraft RV, Inc. travel trailer is equipped with two safety chains, one attached to each side of the tongue or "A" frame. These chains are the primary safety devices that are used to protect life and property. Their use is required by law. It is your responsibility to be familiar with the operation of these chains and to use them correctly.

The hitch on your tow vehicle must be equipped with tow chain attachment points or eyes, one on either side of the hitch ball. The chains are attached to the tow vehicle at these points.

To operate correctly, the chains must cross each other under the tongue before they are attached to the tow vehicle.

Adjust the length of each chain to hold the tongue of the trailer off the ground in the event that the trailer becomes unhitched from the tow vehicle. **DO NOT** make the chains so short that tight turns cannot be made without making the chain tight.

Break-Away Switch

The break-away switch is a safety device that will actuate the trailer brakes if the trailer becomes unhitched from the tow vehicle. This switch is mounted on the tongue of the trailer and is connected to the permanently mounted part of the hitch or to the frame of the tow vehicle with a steel cable. The break-away switch is powered by the onboard trailer battery.

Before each trip, test the switch as follows:

1. **Hitch the trailer to the tow vehicle and connect the break-away switch cable as described above.**
2. **Pull out the break-away switch actuating pin.**
3. **Test the brakes by attempting to tow the travel trailer. The switch is working properly if the trailer brakes are actuated.**

Photograph 4. Break-away switch.

If the brakes are not actuated, make sure that the battery is fully charged, that the wiring is properly connected, and that the trailer brakes are correctly adjusted. If the brakes do not operate after making these checks, you should obtain service repair before towing the trailer.

Replace the break-away switch actuating pin before towing the trailer. Make sure that the onboard battery and the switch are fully operational before towing the trailer.

WARNING: NEVER use the break-away switch as a parking brake. The current needed to operate the brakes will drain the battery in a short time and the brakes will release when the voltage fails.

Brakes

Starcraft RV, Inc. travel trailers are equipped with 12 volt DC operated electrical brakes which are very similar to the standard drum-type brakes found on automobiles. Have the brakes serviced yearly or every 10,000 miles. Before each trip, test the brakes and inspect all the components in the system. Adjust brakes every 3000 miles. Check brake operation every trip. Refer to the Axle Manufacturer Operation, Maintenance and Service Manual in your Starccraft RV, Inc. Owner's Packet. See also *Service Interval Chart* on page 31.

During operation it is helpful to have the trailer brakes come on slightly ahead of the tow vehicle brakes. This causes the trailer to pull against the forward motion of the tow vehicle and helps to keep trailer and tow vehicle in alignment.

Hitching Up

Refer to and become familiar with the operation instructions provided with your hitch. Proceed to hitch up your trailer by raising the tongue with the dolly wheel jack until the hitchcoupler is high enough to clear the hitch ball on the back of the tow vehicle. Back the vehicle until the hitch and coupler are in alignment and lower the tongue until the coupler is firmly seated on the hitch ball.

If a weight distributing hitch is being used, secure the coupler and crank up the dolly wheel jack again until you can install the spring bars in accordance with the manufacturer's instructions. Then adjust the hitch to distribute tongue weight.

Retract the dolly wheel jack, and remove the dolly wheel. The trailer and the tow vehicle should be level or nearly so from front to back and if there is any tilt from side to side it must be very slight.

Connect the wiring harness, safety chains, and the break-away switch. Make an operational check of brakes, brake lights, tail lights, and turn signals before towing.

It is important to lubricate the hitch coupler on the trailer on a regular basis; at least once every 1,000 miles (or 30 days). Ask your dealer to recommend a lubricant.

NOTE: Follow the hitch manufacturer's instructions for adjusting a weight distributing hitch. Damage caused by improper hitch usage will void any portion of the Starcraft RV, Inc. warranty.

Front Deck Models

Your RV is equipped with a front deck for hauling extra cargo. Make sure that you stay within all weight limits for the deck and loading ramps. It is critical for proper handling and trailer maintenance that you weigh your RV completely loaded before heading out on your trip. Make sure to unload the front deck before unhitching your RV from the tow vehicle.

Photograph 5.

Front deck model shown with loading ramps stored underneath the deck. Remove safety snap pins from side rails and loading ramps. Remove side rails, secure loading ramps to trailer frame with the straps and hook before lading or unloading ATVs.

Parking and Leveling

Park on a flat level spot whenever possible; certainly never on a steep slope. Being level is necessary for comfort, but it is also required for correct operation of your refrigerator.

To level the trailer from side to side, use a step ramp which can be constructed from several lengths of 2x6 lumber and placed

under the wheels on the low side of the trailer. Use a bubble level to determine when the trailer is level. DO NOT attempt to level the unit using the stabilizer jacks.

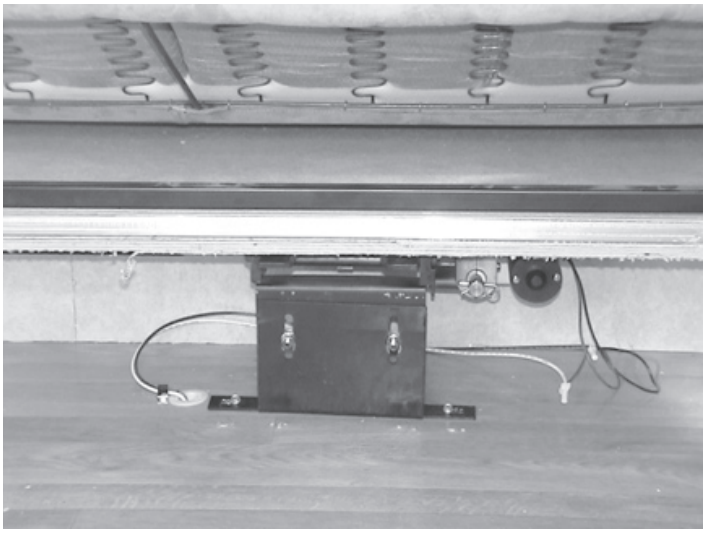
Block the wheels so that the trailer cannot roll, and uncouple it from the tow vehicle. Level the trailer front-to-rear, with the dolly wheel jack. When the trailer is level, run the stabilizer jacks down until making a solid contact with the parking surface. Stabilizer jacks are not intended to lift the trailer or support its entire weight, but to steady it while the weight is supported by the dolly wheel jack and the running gear on travel trailers.

Leveling Units with Slideout Rooms

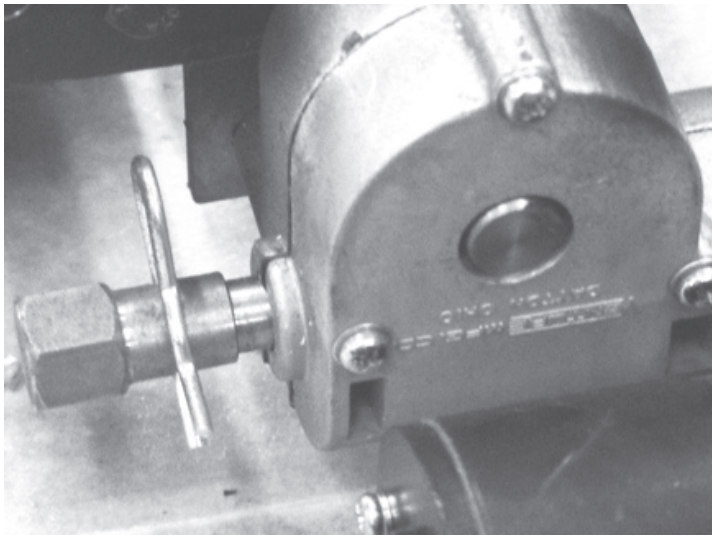
Before operating the slideout room, level and stabilize the trailer as described above. If the trailer is not leveled, the slideout room and/or mechanism may be damaged. The stabilizer jacks will help keep the trailer square and assure a good weather-tight seal between the room and the trailer sidewall.

Slideout Room Operation

Before operating the slideout room, be sure to remove the mechanisms that secure the slideout in the in position. On all electric slide units there are two straight poles with rubber ends which must be removed. Then simply press the slideroom switch to run the room in or out. In the event of an electrical malfunction, the slideroom can be operated manually.



Photograph 6.



Photograph 7.

Manual Slideout Operation

Locate the screws in each end of the kickboard on the interior edge of the slideout. Remove the kickboard to gain access to the slideout mechanism, One end of the mechanism, usually the right end, holds the motor that is attached to the slide components. There is a 3/4″ nut on the motor that can be turned with a wrench or ratchet and socket. Turning this nut will allow the room to come in or go out. After the problem is found and repaired, reinstall the slide kickboard.

Expandable Bed Setup

Expandable travel trailers have fold out beds at each end (depending on model) with a fabric bunkend. Setup instructions with sequential photographs follow.

Photograph 10.
Step 1.
Hook bed supports into brackets on endwalls. Insert lower end of bed support tubes into brackets on A-frame.

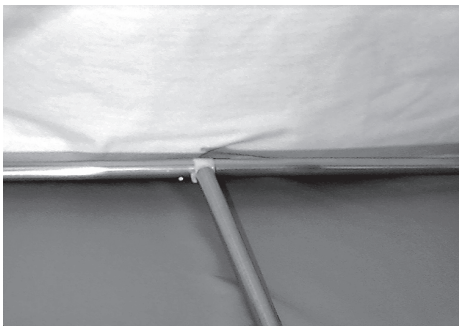
Photograph 11.
Step 2.
Loosen the clamps at the top of the bed, swinging them out of the way. Lower the bed onto the bed supports.

Photograph 12.
Step 3.
Pull the tent out of the opening and wrap the sides and ends over the side and ends over the side edges and end of the bed. Hook the bungee loops (in the hem of the tent sides) over the thimbles on the underside of the bed.

Photograph 13.
All bed braces and tent support poles can be stored in front compartment.

Photograph 14.

Step 4.
Pull the bottom inside corners of the tent around to the inside of the tent retainer and attach to the velcro found on the inside of the tent retainer at the bottom. Reinsert the tent into the tent retainer down to the velcro if any has pulled out.



Photograph 15.

Step 5.
Inside the camper, snap the nylon end of tent support bar onto the center of the tent bow. Push the tent support bar outward, pushing and raising the tent bow to open the tent bunkend.

Photograph 16.

Step 6.
Insert the inner end of the tent support bar adjuster into the bracket centered at the top of the bunkend opening.

Step 7. Unsnap the cushion travel straps at each end of mattress at both bed slides, move the cushions into their proper position and unfold them to their full size.

To close the beds, simply reverse Steps 1 through 7.

The profile drawings (Figs. 5 & 6) on page 21 illustrate the seals used on the front and/or rear beds. Pay particular attention to the flap seal on the front bed. It should be tucked under the bulb seal.

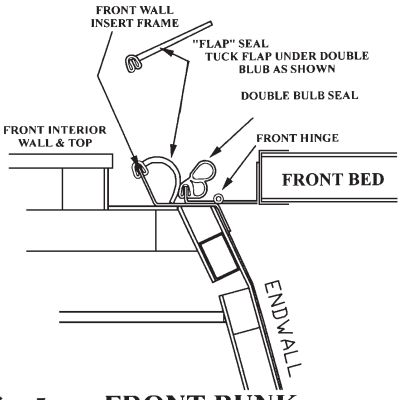


Fig. 5 **FRONT BUNK**

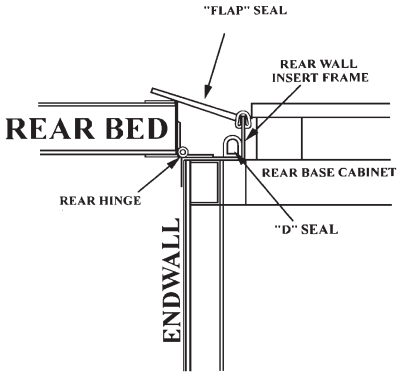


Fig. 6 **REAR BUNK**

Cable Bed Supports

Some models use a cable system and have no external bed supports.

Photograph 16a.

Interior and Furnishings

Storage Compartments and Cabinets

Storage compartments with exterior access doors are fitted with key-operated locks.

Interior storage compartment doors have positive latches to keep them from swinging open during travel.

A few simple guidelines will help keep loose objects in place:

Keep tools and heavy objects stored low and away from the ends of the trailer in areas where they cannot shift while traveling.

Pack articles in drawers and compartments so there is no room for them to shift, using straps or ties where necessary.

Secure glass containers and containers holding liquids to prevent spilling or accidental breakage.

Storage compartments with exterior access may not be water tight under all conditions, so items that are susceptible to water damage should be stored inside the trailer.

Certain areas are called upon to serve multiple functions. Dinettes, lounges and sofas can be converted into beds for nighttime use.

Sofa Bed/Lounge Conversion

To convert the sofa bed for nighttime use, pull the seat up and out at the same time. When the seat has been pulled out as far as it will go, push down on the seat and the back cushion to get them into a flat position.

To convert the sofa bed back to daytime use, tilt the front of the seat up and pull on the back at the same time until the seat and the back cushion move together. Push down on the seat until it rests firmly on the base.

Dinette Conversion

The dinette table in Expandables are supported by pedestals. Set up is fairly simple. Place pedestal posts in receptacles in floor, then place table receptacles on top of pedestals. To convert the dinette into a bed, simply place the table with pedestal posts removed onto the dinette fronts and distribute the cushions. Place pedestal posts in dinette storage area when table is in bed position.

Photograph 17. Table in upright dining position.

Photograph 18. Dinette area setup.

Photograph 19. Stowing table for makeup of bed.

Photograph 20. Cushion placement for bed.

Propane System

Propane is an efficient, portable fuel that burns readily with intense heat. It is used for cooking, heating, and refrigeration. To insure your safety, the propane systems in Expandables are pressure tested for leaks before leaving the factory

With proper maintenance and care, the propane system in your trailer will operate safely for an indefinite length of time. Beyond tightening connections and checking for leaks, propane system maintenance (such as regulator pressure tests) should be performed by an authorized repair facility. Propane bottles should always be filled by an authorized propane supplier. Become familiar with the manufacturer's instructions before using any appliance.

As of September 1, 1997, we have been using the new Type I OPD valve (overfill prevention device) on all propane tanks (4-40 lbs.), on all RV products. This new Type I OPD valve is designed with both male external and female internal threading. It will accept the old POL and regulator you're accustomed to seeing, and it will accept the new Type I hose connection, which became mandatory September 1, 1998 on all propane tanks 4-40 lbs., which now connects the detached regulator to the tank.

The new Type I OPD valve now contains a float operated valve which shuts off propane entering the tank when being filled, at the 80% level, preventing overfilling. It also contains a new, improved, more sensitive excess flow valve which will prevent propane escaping into the atmosphere on all full tanks with no hoses or regulators connected. On the old tank valves, you could open the valve and empty the tank into the atmosphere. Because of the new, more sensitive excess flow valve, we all must learn how to open tank valves. After filling a tank and reconnecting it to the propane system, you **MUST** open the Type I OPD tank valve **SLOWLY**. Opening the tank quickly will lock out the new excess flow valve, preventing propane flow into the propane system. If this happens, close the valve, wait a few seconds and reopen **SLOWLY**. This new excess flow valve will not lock out when an appliance, such as a furnace, comes on.

Regarding old tanks and valves and the new regulations now in effect: As of October 1, 1998, any propane tank, 4-40 lbs., which has reached its 12-year recertification date (12 years from date of manufacture stamped onto the tank), must either be replaced or refitted with the new Type I OPD valve. It will probably be less expensive to replace the tank as a replacement valve will likely be more expensive than a new tank with a new Type I OPD valve on it.

The new Type I OPD valve is easily identifiable in that it is a 3-sided handle with OPD cast into the handle. The new Type I hose connection uses the external threading on the Type I OPD valve and black or green plastic. The new regulations mandating this new propane equipment and rules were created and established by the NFPA (National Fire Protection Association) and are administered by the RVIA.

Propane has a distinctive odor (you might notice this as you light the appliances). If you smell propane, immediately investigate the source. Propane is heavier than air and settles in low areas. It could cause suffocation or create a fire hazard. A propane leak detector can provide warning of propane leaks and help to minimize these dangers.

⚠ DANGER

IF YOU SMELL PROPANE

1. Extinguish any open flames, pilot lights and all smoking materials.
2. Do not touch electrical switches.
3. Shut off the propane supply at the container valve(s) or propane supply connection.
4. Open doors and other ventilating openings.
5. Leave the area until odor clears.
6. Have the propane system checked and leakage source corrected before using again.

FAILURE TO COMPLY COULD RESULT IN EXPLOSION RESULTING IN DEATH OR SERIOUS INJURY. DD-90

Filling The Propane Bottle(s)

Be sure that all the appliances are off, then close the service valve on top of the propane bottle(s). Disconnect the bottle(s) and transport it in an upright position to an authorized propane supplier for filling. Propane suppliers are listed in the yellow pages of the telephone directory. Your local supplier will have the correct blend of propane for your area. Ask for his recommendations if altitude or temperature differences are to be considered.

Photograph 21. Removal and replacement of propane bottle(s); close service valve, disconnect flexible hose connector nut (right-hand thread), loosen hold down, remove tank.

Photograph 22.

Propane Bottle Maintenance

Propane bottles should be kept free of rust at all times. If rust does develop, the bottle should be cleaned completely free of the rust, primed, and painted white (or some other highly reflective color) which will help to reduce expansion of the propane because of heat.

The service valve opening should be checked for leaks periodically, and the threads on the regulator (POL nut) inspected for damage and wear.

Propane System Operation

When operating any propane appliance, make sure that all knobs and control valves are set to the "Off" position before opening the service valve on the propane bottle. Follow the manufacturer's instructions concerning the operation of pilot lights, furnace controls, etc.

Do not allow propane to escape into the trailer for any length of time before attempting to light a propane appliance. Fire and explosion can result.

When the service valve on the propane bottle is closed, some propane will remain in the lines unless a burner is lit to burn off the excess. Turn the burner to "Off" when the flame goes out.

Propane Line Check

The propane lines should be checked for leaks on a regular basis. A good time to do this is after a propane bottle refill.

Check the propane line connections as follows:

a) Turn off all burners and pilot lights.

b) Open the door and windows.

c) Open the propane bottle service valve.

d) Test all line connections with an approved leak detector, bubble solution or soapy water. DO NOT use solutions with ammonia or chlorine which will attack copper tubing or brass fittings. Tighten any leaky connections and test for leaks again. If leaking persists, close the service valve and contact your Starcraft RV, Inc. dealer or authorized propane supplier.

WARNING: DO NOT place or store propane cylinders, gasoline, or other flammable liquids inside the trailer. Propane cylinders are equipped with safety devices that relieve excess pressure by discharging propane to the atmosphere. An improperly used or poorly maintained propane system can cause a fire or explosion.

Pressure Regulator

The regulator pressure should be checked periodically to ensure efficient operation of the appliances. The correct line pressure for all of the propane appliances is eleven (11) inches of water column pressure. Most propane suppliers have the equipment to make this check for you; line pressure should be tested at least every six months.

NOTE: Propane regulators must always be installed with the regulator vent facing downward. Regulators that are not in compartments have been equipped with a protective cover. Make sure that the regulator vent faces downward and that the cover is kept in place to minimize vent blockage that could result in excessive propane pressure causing fire or explosion.

Auto Switch Over Valve

The auto switch over valve is part of the pressure regulator and is at the top. Notice the plastic dome with a pop-up red/green indicator. The purpose of the switch over is to allow switching from an empty tank to the second, presumably full tank, automatically.

When two full tanks are installed, open both tank valves. When one tank goes empty, a red indicator will pop up in the dome. The valve will automatically switch to the full tank. On the front of the switch over valve is a black plastic lever. Move the lever toward the full tank. Move the lever to the right if it is to the left, and vice versa. Whichever way you move it, it will be to the full tank. Once you have moved the lever toward the full tank, the green indicator will again appear. You may now close the valve on the empty tank, remove the tank and have it refilled. Reinstall the full tank, connect the hose and open the tank valve.

NOTE: both tank valves must be open in order for auto switch over to occur.

Photograph 23. Auto switch over valve.

Freeze-Up

Freeze-up of propane bottles is usually caused by one of three things:

1. Moisture in the bottle.
2. Extremely cold weather.
3. A greater demand than the bottle capacity at a particular temperature.

You can use these precautions to prevent this problem:

1. Use moisture-free propane.
2. Keep the service valves closed during storage.
3. Have the dealer add anhydrous methanol.

Propane does not vaporize as readily at lower temperatures, so appliance demands may have to be reduced when camping in cold weather.

If moisture is a problem, ask the propane dealer to purge the bottle. Anhydrous methanol can be added to reduce moisture content.

NOTE: Starcraft RV, Inc. is not responsible for personal injury or property damage resulting from the misuse or improper maintenance of the propane system or appliances. See also *Fire Safety,* page 29.

Electrical System

Your Expandable is equipped with a heavy-duty power cable that is capable of carrying up to 30 amps depending on the options selected. They are also supplied with a 110 volt AC electrical converter capable of producing 12 volt DC. Electrical outlets in the bathroom and the patio outlet are wired through a special circuit breaker known as a ground fault interrupter or GFI breaker which provides protection against electrical shock in damp or wet areas.

Electrical Hazards

The two major hazards that exist are electrical shock and fire hazard (caused by shorted or overloaded wiring).

All wiring and connections in Starcraft RV, Inc. Travel Trailers are fully insulated to protect you and your family from electrical shock.

In addition, all 12 volt circuits are protected with fuses, and all 110 volt circuits are protected with circuit breakers to prevent fire hazards caused by short circuits or circuit overloads.

To minimize the possibility of damage to the trailer or injury to you and your family, please heed the following warnings.

WARNING: DO NOT use a cheater plug (one with the ground wire pin removed) to hook up your trailer to a 110 volt plug-in. DO NOT use an extension cord with a lower current rating to plug into an electrical hookup that is beyond the reach of your trailer's power cable.

An extension cord rated for 15 amps (for example) has a higher "resistance" to the "flow" of electrical "current". A 30 amp load passing through a 15 amp extension cord will cause the cord to heat up and can melt the insulation on the wiring resulting in short circuiting and fire.

Even if fire does not result, the increased resistance in the 15 amp extension cord may cause a voltage drop which can result in damage to appliances with electrical motors.

NOTE: To avoid possible damage to the motor driven appliances in your Travel Trailer, Starcraft RV, Inc. suggests the use of a plug-in volt meter that can be used to monitor the line voltage from your hookup. In many campgrounds the power requirements of a large number of trailers may cause the line voltage to drop enough to result in damage to your appliances.

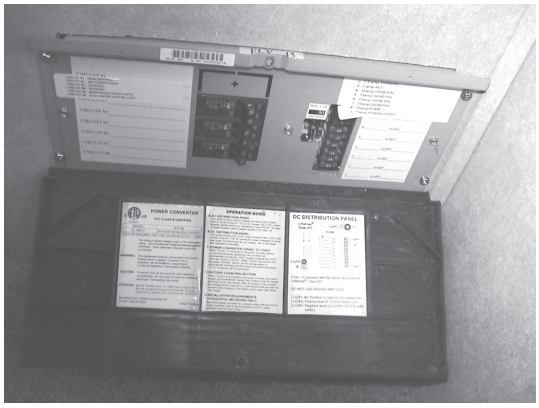
Wiring Schematic

A typical 12 volt running light wiring schematic for the travel trailers is shown at the back of this manual.

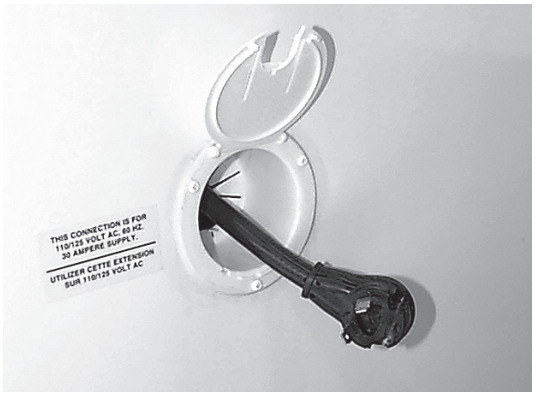
Circuit Overloads

To troubleshoot an overloaded circuit, proceed as follows:

1. Turn off all electrical appliances.
2. Replace fuse or reset circuit breaker by setting it momentarily to "Off" and then back to "On".
3. By the process of elimination, determine the cause of the overload. If caused by a faulty appliance, have the appliance repaired before using it again. If caused by faulty wiring, have the wiring repaired by a serviceman as soon as possible.



Photograph 24. Converter



Photograph 25. 110 Volt Power Cord

110 Volt System

The power cord for the 110 volt electrical system is stored in the electrical storage compartment which is accessible from the outside of the trailers.

This cable and the attached plug are molded together to form a weather proof assembly. **DO NOT** cut or alter this assembly in any manner.

The 110 volt system supplies power to operate your converter, refrigerator, air conditioner, and portable appliances. Before using portable appliances, check their power requirements to make sure that they will not cause system overload.

12 Volt System

The 12 volt system supplies power for the interior and patio lights, water pump, and appliances that are equipped with electronic spark ignitions, or that operate on 12 volt DC.

12 volt DC power is supplied by an onboard battery, or, by the converter when the trailer is plugged into 110 volt AC power. Running lights are powered by the tow vehicle and are fused in the tow vehicle. An onboard battery is charged by the converter or tow vehicle if wired to do so.

Converter – Expandable

The Elixer converter in travel trailers is an electronic switch mode power center which houses the converter, all 12 Volt DC output fuses and the 110 Volt AC circuit breakers. The converter supplies 45 amps of 12 V DC output to the trailer. To access circuit breakers and fuses, open down the access door on the front of the converter.

NOTE: It is good practice to have everything turned off in the trailer before connecting the power cord.

WARNING: DO NOT replace a blown fuse with one that has a higher amperage rating. If a fuse continues to blow (or circuit breaker to trip), DO NOT attempt to bypass it with a piece of wire. Determine the reason for the overload and have it repaired before using the circuit again. DO NOT attempt wiring repairs on a "live" circuit. Turn off all appliances and disconnect the trailer from all sources of 110 volt and 12 volt electricity.

These converters will not self-destruct when subjected to short circuits or overloads. If a circuit is overloaded there will be a sound indication.

If a short circuit develops, the converter will shut down automatically. Once short circuit is corrected, the converter will function again.

In an extreme output, over current situation the converter will sound an audible alarm and the voltage will drop to 12.5 volts. Simply reduce your power demand by turning off the last appliance that triggered the alarm. The alarm will stop and your converter will return to normal operation. When the converter 12 V DC output has shut down, 110 V AC will still be available in the trailer.

In a 45 amp converter additional protection is provided in the battery to converter charge line against reversed polarity; by a fuse that will blow if the battery is not connected correctly.

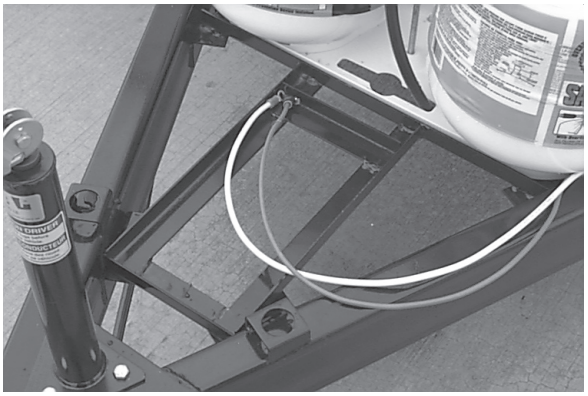
The converter is designed with a constant voltage of 13.5-13.6 volts at no load and 13.1 volts at full load to ensure trouble-free service of all DC appliances.

For a faster charge, simply reduce the 12V load on the converter. Once the RV battery is fully charged, the converter will reduce the charge rate to maintenance rate until more charge is needed.

Last but not least, there is a semi-automatic circuit breaker in the battery to converter/charge line cable to protect the cable. This breaker is located behind front wall under a plastic cover. In the event of a short or over current, this breaker will open. It will remain open until you reset the breaker. To reset the breaker, you must disconnect the red battery cable from the battery positive terminal. Once disconnected, the breaker will reset. Then reconnect the cable.

Because of circuit design, the converter, when not in operation, will draw current from the battery at an average rate of under 5 milliamperes. Additionally, the propane leak detector will draw approximately 75 milliamperes. To avoid a dead battery during long term storage, (which will occur in 10-20 days depending on the battery condition and capacity), disconnect the battery from the converter. The easiest way to accomplish this is to disconnect all cables connected to the battery positive post.

Battery Location



Photograph 26. Battery Location

Water Systems

Fresh Water

Fresh (potable) water is supplied from one of two sources:

Storage Tank

Water is stored in an onboard storage tank and is distributed to the various faucets by an automatic, self-priming pump which is operated by the 12 volt electrical system. This pump will function when power is available and the pump switch is "On".

This water storage tank is filled using the exterior tank fill.

NOTE: Do not leave water in the tank when the trailer is not in use. Be sure the pump switch is turned "Off" before draining the tank.

City Water

Water, under pressure, is provided when the trailer is connected to a park or city water supply. Connect the trailer as follows:

1. Turn the 12 volt water pump to "Off".
2. Remove the protective cap on the city water fill, and connect a hose between the city water supply and the city water fill on the trailer.
3. An in-line 60 psi pressure regulator is recommended to protect the trailer's water system.
4. Open the city water supply valve.
5. Open the faucets in the trailer and let the water run a few minutes to clear the lines.

See *Normal Operation of Water System*, page 26.

NOTE: As long as the water system is hooked up to a city water supply, the onboard storage tank and the 12 volt pump are isolated from the system. Do not turn the pump to "On" until the city water supply is disconnected in order to avoid damage to the pump.

Sanitizing the Water Storage Tank

Sanitize the fresh water storage tank periodically using chlorine solution followed by several clear water rinses.

Prepare a solution of 1/4 cup of household-type liquid chlorine bleach to one gallon of water for each 15 gallons tank capacity (a 45 gallon tank would require 3/4 cup of bleach in 3 gallons of water).

Close drains and valves, pour chlorine solution into the storage tank, and complete filling the tank with fresh water.

Open faucets in turn until water flows steadily to purge air from lines.

Top off the tank with fresh water and allow the solution to work for three hours.

Drain the tank and flush the entire system with fresh water.

If the chlorine taste lingers, pour a solution of one quart of vinegar and five gallons of fresh water into the tank and allow it to remain there for a day or two, agitated by the normal motion of driving. Then drain the tank and flush the system until the vinegar taste disappears.

WARNING: DO NOT use contaminated system until it has been cleaned and thoroughly flushed (4 - 6 flushes), with water. Keep children away from unit until the water is safe to drink.

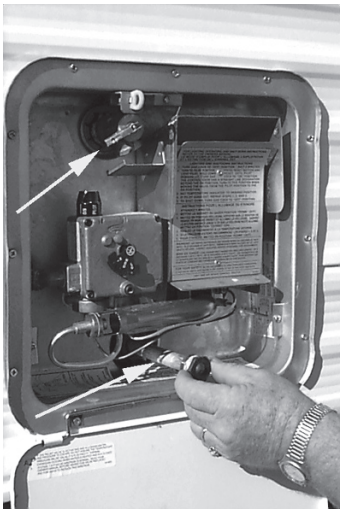
DO NOT run the pump without water in the system. Always keep the pump switch "off" when the system is empty or when connected to city water. Running the pump dry can damage it and will void the warranty.

Draining the Water System and Heater

If the trailer is to be stored in temperatures below freezing, the fresh system and the waste water system should be drained as follows:

1. Empty the fresh water storage tank by removing the drain plug.
2. Turn the pump to "On" and open cold water faucets.
3. Turn the pump to "Off" when the flow of water stops.
4. Open the drain valves on the hot and cold water pipes located under floor of unit.
5. Open the drain valve on the bottom of the water heater, as well as the water heater safety valve.
6. Open all the faucets and depress the flush pedal on the toilet to promote drainage.
7. Drain the holding tanks using the outlined procedures in the following section.

WARNING: Automotive or windshield washer type antifreeze can be fatal if swallowed. DO NOT use them in the fresh water system.



Photograph 27.
Water heater; pressure relief valve at top, drain valve anode at bottom.

Photograph 28.
Water storage tank drain and low point drains – typical.

NOTE: when draining the water heater, use a 1-1/16″ socket to remove the drain plug. The drain plug is also the sacrificial anode which protects the tank from chemical deterioration and electrolysis. As the water heater is used and ages, the anode will deplete. It will have a rather disgusting, eaten away appearance. This is normal. When completely or mostly gone, it should be replaced.

Normal Operation of Water System

1. Position water heater bypass valves for normal operations (1-open, 2-open, 3-closed). See Fig. 7.
2. Connect city water to trailer city water hookup.
3. Turn on city water.
4. Open all faucets and flush system several times.

Winterizing the Water System with Anti-Freeze

1. Turn off and disconnect city water and open all faucets.
2. Drain water system:
   a. open low point drains
   b. drain water tank
   c. drain water heater
3. Position water heater valves for bypass operation (1-closed; 2-closed; 3-open).
4. Pour antifreeze into water tank through exterior tank fill.
5. Turn on pump, pumping antifreeze into water system. Open all faucets, one at a time, until red antifreeze appears.
6. Flush toilet to move antifreeze into the toilet valve.

Winterizing the Water System with Air

An alternate way to winterize with antifreeze is to use air to blow out the system as follows:

1. Drain system as in steps 1 through 3 in winterizing with antifreeze above.
2. Close all drains and faucets.
3. Connect compressor to unit at city water fill.

   NOTE: Parts are readily available at your local hardware to make an adapter to connect a compressor to the city water fill.
4. Set compressor regulator at 60 PSI. The trailer water system is rated for maximum 60 PSI
5. Turn on compressor, allowing pressure to build up, until compressor turns off. Proceed throughout trailer, opening low point drains and faucets, one at a time, allowing water to exit until only air is present. Don't forget the toilet. Begin at whatever outlet is closest to the compressor. Also, open water heater drain to blow out water remaining in heater.
6. Close valves and drains. Remove compressor.
7. Even though you have blown all water out of your trailer, you must still winterize the fresh water tank and the pump. See previous discussion.

Filling Fresh Water Tank

The fresh water tank is filled by pouring water out of a portable container into the gravity water fill found on the driver's side of the trailer or by using a hose connected to a city water hookup.

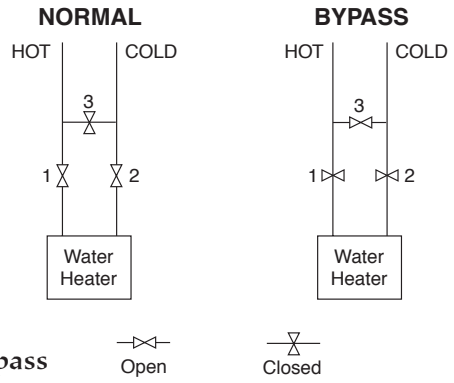


Figure 7:
Water Heater – Normal and Bypass

Waste Water System

Your travel trailer has a self-contained drainage system for the collection of sewage and waste water (gray water) in separate holding tanks where they are held until the contents can be drained into an approved disposal station.

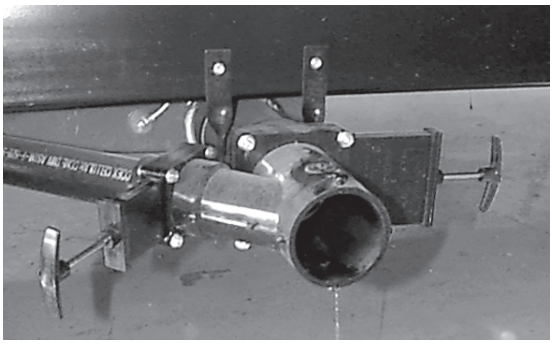
The removal of solids from holding tanks can be accomplished more effectively if the tanks are relatively full of liquid. Remember, do not pull the holding tank dump valve open when the drain cap is in place.

NOTE: Draining the water systems alone will not provide adequate cold weather storage protection. Follow the special procedures in this section.

Draining The Holding Tanks

To drain the holding tanks, proceed as follows:

1. Remove the flexible drain hose from its storage place.
2. Place a container under the drain outlet to catch any liquid that may be trapped between the dump valves and the drain cap.
3. Remove the drain cap, connect the flexible hose to the drain, and insert the other end of the hose into a ground sewer or dump station inlet. Make sure the hose is securely fastened in place. Adapters may be needed to mate the hose to the dump station inlet. The hose should slope from the trailer down to the dump station to promote drainage.
4. Open the large dump valve to allow drainage from the sewage holding tank.
5. Allow sufficient time for the tank to drain then rinse the tank with fresh water.
6. Drain and rinse the gray water storage tank using the small dump valve.
7. Disconnect the flexible drain hose, rinse clean, and replace it in its storage compartment.
8. Clean and store drip bucket and replace drain cap.
9. Make sure that the dump valves are closed before replacing the cap.



Photograph 29. Holding tank drains; large knife valve, one on right, controls sewage; smaller one on left controls gray water.

Winterizing the Waste System

Once the black and gray holding tanks have been cleaned, and drained, no further winterizing should be necessary.

P-traps under all sinks and the tub-shower hold water. They should have antifreeze added to them. Run at least a pint of antifreeze into each drain.

Holding Tank Do's and Don'ts

DO clean the holding tank with an approved cleaner.

DO add a special chemical additive to sanitize and improve tank action.

DO guard the tank against freeze up.

DO keep the dump valves closed to allow the tanks to get as full as conveniently possible to facilitate drainage.

DO keep the dump valves closed and the drain cap in place to allow use of the system while traveling.

DO use any soft, single ply biodegradable toilet tissue.

DO open the bathroom vent to dispel condensation and odors.

DON'T put facial tissues, paper, automotive type antifreeze, sanitary napkins, or household toilet cleaners in your holding tank.

DON'T put foreign objects into the system which could clog or damage it in any way.

WARNING: Holding tanks are enclosed sewer systems and must be drained into an approved dump station or ground disposal area. Holding tanks must be drained and cleaned regularly to prevent the buildup of harmful or toxic materials or fumes.

Appliances

All appliances installed in Starcraft RV, Inc. travel trailers are of the highest quality. The Owner's Information Kit contains operating instructions and warranty registrations for each appliance. Warranties should be validated as soon as possible. Become familiar with the operating instructions.

WARNING: LAWS in some states prohibit the operation of any propane appliance while in motion because of the danger of fire or explosion if an propane line under pressure happens to be ruptured in an accident.

Air Conditioner

Optional roof mounted air conditioners operate on 110 volt AC. For best performance, park in shaded areas whenever possible. Close doors and windows before turning on the air conditioner. Remember: this appliance consumes a large portion of your available electric power.

Furnace

Furnaces installed on Starcraft RV, Inc. travel trailers are of the forced air type, equipped with thermostats, and designed to operate on propane. Follow the manufacturer's instructions carefully when operating the furnace.

Power Vents

Power vents are located in the bathroom (select models) and in range hood. The vent in the range hood has a grease filter which will require periodic cleaning in soapy water.

Range

A three-burner cooktop is standard in Expandables. The cooktop is propane fueled with no pilot. Use an external igniter or a match to light each burner. An optional range-oven combo is available. The oven will have a pilot. See the owner's manuals for details of operation.

WARNING: IT IS NOT SAFE TO USE COOKING APPLIANCES FOR COMFORT HEATING. Cooking appliances need fresh air for safe operation. Before operation:

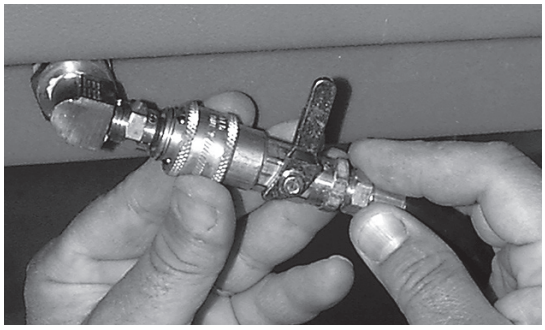
1. **Open overhead vent or turn on exhaust fan, and,**
2. **Open window.**

Unlike homes, the amount of oxygen supplyis limited due to the size of the recreational vehicle. Proper ventilation when using the cooking appliance(s) will avoid dangers of asphyxiation. It is especially important that cooking appliances not be used for comfort heating, as the danger of asphyxiation is greater when the appliance is used for long periods of time.

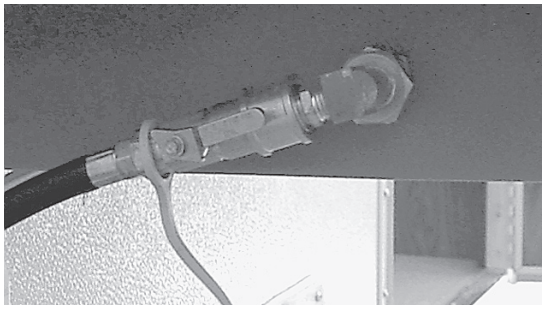
An propane three-burner carryout range is optional in Expandables. A cooktop with oven is available. The burners must be lit manually as described previously. The carryout range is to be used outside, hanging on the exterior sidewall. A propane flex hose, with a quick disconnect, is provided. To make the propane connection, the shutoff handle must be at right angles to the coupler. See photo sequence below. Pull the collar on the coupler toward the hose while inserting the male fitting on the stove box into the coupler. Once connected, push the collar back toward the range, making the connection. Rotate the shutoff handle, making it parallel with the coupler, turning on the propane and locking the coupler. To remove, reverse the process.

When in use, the range hangs on an extrusion on the doorside sidewall, over the wheels. The flex hose with the propane quick disconnect is found in a round white hatch, like the one used for the power cord.

A warning label has been located in the cooking area to remind you to provide an adequate supply of fresh air for combustion.



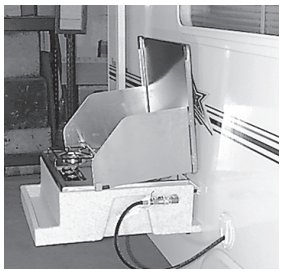
Photograph 30. Connecting quick-disconnect (valve closed)



Photograph 31. Connecting quick-disconnect (valve open)

Unlike homes, the amount of oxygen supply is limited due to the size of the camper. Proper ventilation when using the cooking appliance will avoid the dangers of asphyxiation. It is especially important that cooking appliances not be used for comfort heating as the danger for asphyxiation is greater when the appliances are used for long periods of time. Also, see *Special Safety Procedures*, page 6.

NOTE: Store the range and carry out gas grill inside overnight and during bad weather.



Photographs 32 & 33. Carryout range and carry out gas grill attached to outside of trailer, on doorside sidewall.

⚠ WARNING

IT IS NOT SAFE TO USE COOKING APPLIANCES FOR COMFORT HEATING.

Cooking appliances need fresh air for safe operation.

Before operation:

1. **Open overhead vent or turn on exhaust fan.**
2. **Open window.**

FAILURE TO COMPLY COULD RESULT IN DEATH OR SERIOUS INJURY. DD-26C

Refrigerator

The refrigerator operates on 110 volt AC or propane. Efficient operation requires that the trailer be level.

See the manufacturer's literature for complete operating instructions.

Water Heater

A gas water heater is standard but a gas/electric with DSI (direct spark ignition) is optional on select models.

Instructions for lighting and operation of the water heater are located in the water heater compartment which is accessible from the outside of the trailer and in the water heater owner's manual.

The optional gas/electric DSI is a fast recovery water heater which provides a continuous supply of hot water. The water heater can run on gas or 110 volt electric, or run on both simultaneously which increases the speed of recovery..

NOTE: New chamber coatings may give off a slight odor the first few hours of use. Further information is given under *Water Systems,* page 25.

WARNING: BEFORE lighting the water heater, make sure that it is full of water! Operating the water heater without water will cause damage to the water heater.

Obtaining Service

Starcraft RV, Inc. warrants only proper installation of appliances. The appliances themselves are warranted by the manufacturer. In the event that any of the appliances in your Starcraft RV, Inc. Travel Trailer require service or replacement under the terms of the manufacturer's warranty, you should contact the manufacturer directly. Appliance Service Centers are listed in the manufacturer's literature.

Fire Safety

Fire safety is **IMPORTANT!** Make certain that everyone in your party is familiar with the location and operation of the fire extinguisher and the emergency exits. Emergency exit windows have red quick release handles.

Smoke Alarm

The smoke alarm in your Starcraft RV, Inc. travel trailer is designed to detect both visible and invisible products of combustion which are created by fire. In addition, this battery-operated alarm does not need adjustment and provides an audible signal when its batteries require replacement. Your Travel Trailer owner's packet contains the manufacturer's instruction sheet which has detailed information about the operation and maintenance of this alarm.

REMEMBER: A smoke alarm can only warn of dangerous situations that already exist! No alarm can eliminate the hazards that arise from smoking in bed, storing flammable materials inside the trailer, leaving children unattended around propane or electric appliances, or other unsafe practices.

Propane Detector

A propane detector has been installed in your trailer to warn of escaping propane into the living quarters. The detector will sound a visible and an audible alarm. In addition to warning of the presence of propane, it will also warn of low battery voltage and eventual cessation of operation and detection when voltage drops too low. Read the user's manual to become familiar with operation and alarms.

Fire Extinguisher Locations

Photograph 34. Fire extinguisher location.

Fire extinguishers are located close to the front (or forward) door of the trailer, mounted on the wall or side of a cabinet. Know where the extinguisher is located and **CHECK IT FREQUENTLY** to assure that it is in good working condition.

Emergency Exits

In two-door trailers, the rear door is designated as the emergency exit. In single door models, a specially constructed window toward the front or rear of the trailer will be identified with a sticker.

Prevention is the best form of safety. Follow the same rules you would at home.

DO NOT smoke in bed.

DO NOT overload electrical circuits.

DO NOT use matches, candles or lighters as flashlights.

DO NOT store flammable liquids inside the camper.

DO NOT permit children to play with propane or electric appliances.

YOUR BEST SAFEGUARD AGAINST FIRE IS TO BE ON GUARD, ALL THE TIME!

Photograph 35. Emergency exit window showing exit sticker and release handles.

Condensation

Effects of Long Term Occupancy

Your travel trailer was designed primarily for recreational use and short term occupancy. If you expect to live in your trailer for extended periods of time, or in cold or cool weather, be prepared to deal with condensation and the humid conditions that may be encountered. The normal activities of even a small number of occupants in the relatively small volume of a modern recreational vehicle, with its thin walls and tight construction, will lead to rapid saturation of the air inside the trailer and the appearance of visible moisture, especially during cold weather.

Estimates indicate that a family of four can vaporize up to three gallons of water daily through breathing, cooking, bathing, and washing. Unless this vapor is carried outside by ventilation, or removed from the air by a dehumidifier, it will condense on the inside of windows and walls as moisture. In cold weather, it will appear as frost or ice. It may also condense in the walls or the ceiling and appear as stains on the paneling.

Controlling Condensation

Interior condensation can be reduced (during cold weather) with the following steps:

Ventilate with Outside Air

Partially open one or more roof vents and windows to provide controlled circulation of outside air to the inside of the trailer. This will increase the heating load on the furnace somewhat, but it will greatly reduce condensation. You should increase ventilation when large numbers of people are present.

NOTE: Even when it is raining or snowing, outside air is much drier than interior air and will effectively reduce condensation. Be sure to run the power vents in the range hood and bathroom (select models) when cooking or bathing.

Ventilate Closets and Cabinets

During cold weather, leave closet and cabinet doors open to warm and ventilate the interiors of storage compartments which are built against exterior walls. The air flow will warm the exterior wall surface, reducing condensation.

Install a Dehumidifier

The use of a dehumidifier will reduce the need for outside ventilation. As a result, the heating load on the furnace will be reduced.

Storage

Preparation

If your travel trailer is not used during the winter months, it is best stored indoors, especially if you live in an area where snow accumulation can form a heavy load on the trailer roof. If stored outside, keep the roof swept free of snow and ice. **DO NOT** allow snow to accumulate on the roof. In addition to possible damage caused by excess weight, freezing and thawing of snow or ice may cause leakage through the roof seams along the top edge of the sidewalls and the roof end metal transition at each end.

If the trailer is to be covered with canvas or plastic, open the windows and roof vents enough to provide ventilation to prevent mildew and mold inside.

REGARDLESS OF METHOD OF STORAGE, OPEN TRAILER EVERY 30 DAYS TO INSPECT INTERIOR CONDITION.

WARNING: Damage caused by, or as a result of, the method of storage (i.e. covering or snow loads) will not be covered under warranty.

In preparation for storage, perform the following steps:

1. Level the unit for good drainage.
2. Clean the inside of the trailer and air it out thoroughly.
3. Remove all perishable items. Wipe the refrigerator clean with a damp cloth and baking soda and leave the door propped open. Clean rugs, draperies and upholstery, and remove all stains.
4. Shut off service valve on propane storage bottles, and bleed propane lines.
5. Drain the water storage tank, the water heater and water lines and sink traps. Drain and rinse the holding tanks, and replace the drain cap when finished.
6. Use a recommended recreational vehicle type antifreeze or one of the solutions listed below in the plumbing systems to prevent freeze-up of any trapped water. See *Winterizing the Water System* (page 26) and *Winterizing the Waste System* (page 27).
   a) 60% glycerol, by weight, in water, undiluted.
   chloride, by weight, in water, undiluted.
   b) 22% magnesium chloride, by weight, in water, undiluted.

Ask your dealer about the correct dilutions for use in your area.

Lubricate Locks and Latches

Use graphite or a silicon based lubricant in all the locks and latches, and apply lubricant to the door hinges.

Block the Frame

If possible, block the trailer frame up enough to relieve the tires of most, but not all, of the weight of the trailer. Decrease tire pressure to about one half of normal.

DO NOT USE THE STABILIZER JACKS TO LIFT THE TRAILER.

Battery Care

Place the battery on charge, or remove it from the trailer and store it in a warm place to keep it from freezing or discharging. If a battery remains connected to the converter during long term storage, the converter and propane detector will run the battery dead. See, also, converter discussion on pages 24 & 25.

Exterior Cleaning

Wash the exterior metal/fiberglass with a good automotive detergent and a sponge. Always rinse thoroughly to remove all soil and detergent and to minimize streaking. Black streak removers and cleaners are available from your Starcraft RV, Inc. Dealer. Wax with an automotive wax.

Wash the roof with warm water and a household cleaner such as Top Job, Spic-n-Span, or Ajax. Granulated cleaners do a better job. Use a soft bristled brush. For especially stubborn stains, add liquid bleach. Again, rinse thoroughly.

Clean dirt and corrosion from frame. Prime and retouch paint where necessary. Check and restore/reseal roof sealants. Clean air conditioner. Remove interior grills to clean filter and air box. Cover exterior AC shroud.

Warranty Repairs

The first place to seek correction of a warranty problem is always at the dealership where the travel trailer was purchased. In addition, there is a network of Starcraft RV, Inc. dealers who are authorized to perform warranty repair work. Please use your Owner Protection Service (OPS) identification card whenever warranty repair is required on your travel trailer. If you encounter problems that a local dealership cannot help you with, please write:

STARCRAFT RV, INC. WARRANTY DEPARTMENT
P.O. Box 458
Topeka, IN 46571

Spares and Specifications

LOCATION	SPARE 12V BULBS	SPARE 12V FUSES*
Tail/Stop/Turn	3157	Little Fuse Type 257
Exterior Patio/Work	C912	1 amp
Interior Dome	GE921	7.5 amp
Range Hood	912	15 amp
Side Marker	C194	
Fluorescent	03-F8T5	
Reading Light	1139IF	
License Plate	03-168	

*Refer to the decal in the inside of the converter cover which will show the correct rating for each circuit.

Wheel Nut Torque Settings

Before towing the trailer, make sure the lug nuts on all wheels are tight. See the chart on page 17 for recommended torque settings for your trailer's wheel size. During a trip, check the lug nuts frequently and tighten them if necessary.

Routine Maintenance

Keeping a clean, well-maintained trailer will result in many years of camping fun. Following the recommended cleaning procedures will eliminate many of the problems associated with poorly maintained units. A poorly maintained unit can result in the voiding of the warranty, as will negligence, misuse, or the installation of equipment not authorized by Starcraft RV, Inc. Become familiar with the information in this manual and in the appliance manufacturer's instruction sheets.

ITEM	STANDARD CARE
Countertops	Clean with damp, soapy cloth and dry immediately.
Refrigerator	Clean and remove food after each trip.
Stove and Sink	Clean with appropriate cleaners.
Cushions	Use foam type cleaners or warm, soapy water.
Vinyl	Use vinyl cleaner or soapy water.
Curtains	Hand wash with mild detergent and drip dry.
Carpet	Use recommended carpet cleaner, vacuum.
Vinyl Floor Covering	Wash with soapy water, rinse, and wax.
Pre-finished Paneling	Use furniture wax or polish.
Stained Wood	Sand and re-stain if needed.
Propane System	Check for crimped tubing or other damage. Test for leaks with soapy water or leak tester. Paint propane bottle when needed. Have pressure regulator checked regularly.
Water System	Check all hoses, fittings and connections for leaks. Clean tank discharge filter and sanitize system when necessary.
Electrical	Examine all wiring and connections.
Fire Extinguisher	Check pressure regularly and note on inspection tag.
Exterior Fiberglass	Clean with soapy water and wax with a nonabrasive wax. See exterior cleaning, page 30.
Rubber Roof	For normal cleaning standard household detergents can be used to wash the rubber roof material. Rinse thoroughly after cleaning. Be sure to keep the sidewalls wet to reduce streaking. The rubber roof material can be cut by sharp objects. Use caution when loading sharp articles on the roof. See exterior cleaning, page 30.
Air Conditioner	Clean evaporator and condenser coils, filter and pan. Cover outside when not in use.

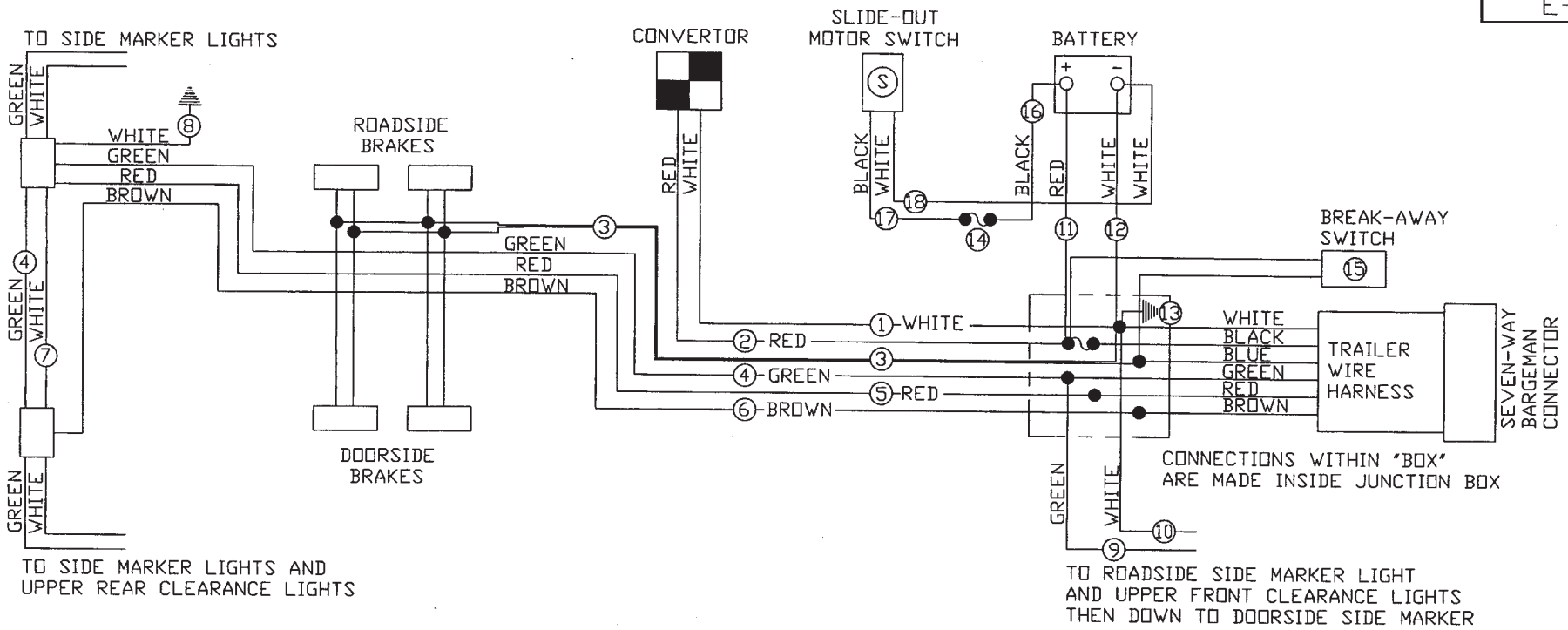
Service & Service Chart

The operations listed in the Service Chart should be performed on a regular basis. If you are not prepared or equipped to handle these steps, please have them performed by your Starcraft RV, Inc. Dealer or other qualified service technician.

	SERVICE INTERVAL:						
	Each Trip/ Weekly	500 Miles	1,000 Miles/ 30 day	2,500 Miles	3,000 Miles/ 90 day	5,000 Miles/ 6 months	10,000 Miles/ Yearly
Service To Be Performed:							
Pack wheel bearings							X
Service brakes							X
Adjust brakes					X		
Inspect safety chains		X					
Inspect wiring		X					
Inspect tires		X					
Inspect hitch components			X				
Lubricate coupler latch & socket			X				
Lubricate hinges							X
Lubricate locks							X
Inspect and clean vents							X
Check wheel nut tightness		X					
Torque wheel nuts					X		
Sanitize fresh water system				X			
Clean drapes and interior fabrics							X
Inspect exterior seams and openings*				X			
Reseal exterior seams and openings*							X
Clean battery cables/terminals						X	
Check battery fluid levels				X			
Inspect suspension						X	
Fresh water tank outlet screen				X			
Check tire wear & inflation		X					

***The seal along the edges of the roof and at the corners of the trailer should be checked every 60 days.**

Check the roof for damage (such as punctures from falling objects) frequently. Damage to the roof can result in leaks and subsequent damage to interior parts of the trailer.



#	COLOR	GA.	QTY.	LENGTH	DESCRIPTION
1	WHITE	8	1	460	J-BOX TO CONVERTOR
2	RED	8	1	460	J-BOX TO CONVERTOR
3	BRAKE WIRE	14-2	1	200	J-BOX TO BRAKES
4	GREEN	16	1	800	J-BOX TO TAIL/CLEARANCE
5	RED	16	1	480	J-BOX TO LEFT TURN
6	BROWN	16	1	480	J-BOX TO RIGHT TURN
7	WHITE	16	1	320	REAR TAIL/CLEARANCE
8	WHITE	16	1	60	TAIL/CLEARANCE TO GROUND
9	GREEN	16	1	480	J-BOX TO FRONT CLEARANCE

#	COLOR	GA.	QTY.	LENGTH	DESCRIPTION
10	WHITE	16	1	480	J-BOX TO FRONT CLEARANCE
11	RED	8	1	48	BATTERY TO 30A BREAKER
12	WHITE	8	1	48	BATTERY TO J-BOX GRND
13	WHITE	8	1	6	GROUND TO FRAME
14	-	-	2	-	30A SEMI-AUTOMATIC THERM BRKR
15	-	-	1	-	BREAKAWAY SWITCH
16	BLACK	10	1	60	BATTERY TO 30AMP BREAKER
17	BLACK	10	1	72	BREAKER TO S/O SWITCH
18	WHITE	10	1	132	BATTERY TO S/O SWITCH

Typical Travel Trailer 12 Volt Schematic

Go RVing®

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